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HEAT-TRANSFER CHARACTERISTICS
OF 98% H₂O₂ AT
HIGH PRESSURE AND HIGH VELOCITY

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FOREWORD

This special report presents the results of an investigation, conducted under Contract AF 04(611)-10785, to determine the heat-transfer characteristics of 98% H₂O₂ at high pressure and high velocity. Portions of this study have been presented in various progress reports and have been compiled herein to assist the reader in application of the technology discussed.

The investigation was part of the Advanced-Propellant Staged-Combustion Feasibility Program conducted by the Advanced Storable Engine Division of Liquid Rocket Operations, Aerojet-General Corporation, Sacramento, California.

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ABSTRACT

High-pressure heat-transfer experiments have been conducted with both 90 and 98% H₂O₂. Electrically heated 3/16- and 1/4-in.-dia Inconel 718 and 3/16-in.-dia stainless-steel test sections were used, at pressures of 850 to 4700 psi and at coolant velocities of 25 to 198 ft/sec. Titration of the peroxide after short-duration testing indicated that little or no H₂O₂ decomposition had occurred in the test section. The short-duration burnout tests have shown that the maximum burnout heat flux is directly proportional to coolant velocity and is insensitive to coolant pressure. The Dittus-Boelter equation was found to yield a conservative estimate of heat-transfer coefficients for 98% H₂O₂ and is recommended for design purposes. Long-duration tests conducted at velocities of 50 to 150 ft/sec with Inconel 718 tubing indicated that the long-duration burnout heat flux is degenerated to about 65% of that demonstrated in short-duration tests. Titration of the peroxide after these tests indicated that minor H₂O₂ decomposition had occurred.

It can be concluded that 98% H₂O₂ would be an excellent regenerative coolant in rocket engine systems. The long-duration burnout phenomenon at high pressure can be avoided by limiting the design burnout heat flux to about 65% of the short-duration burnout point.

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I.

INTRODUCTION AND SUMMARY

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INTRODUCTION AND SUMMARY

Advanced concepts for storable propellant liquid rocket engines have been under extensive investigation for the past few years. These studies have shown that the performance of existing N₂O₄/AeroZINE 50 systems can be increased significantly by using high chamber pressures, a staged-combustion engine cycle, and fuels that are gelled mixtures of hydrazine and metals or metal hydrides. The system under investigation in the Advanced Propellant Staged Combustion Feasibility Program, Contract AF 04(611)-10785, employs 98% H₂O₂/Alumizine-43 propellants at a chamber pressure of 3000 psia. It has been established that a regenerative coolant for this system must be capable of accepting high heat fluxes.

Because of the low burnout-heat-flux limits and because of the uncertain heat-transfer characteristics of Alumizine (1), 98% H₂O₂ was chosen as the more suitable regenerative coolant for 98% H₂O₂/Alumizine-43 systems. The feasibility of using H₂O₂ as a regenerative coolant has previously been demonstrated in experimental investigations with 98% H₂O₂ (2) and 90% H₂O₂ (2, 3, 4). These previous results were obtained at relatively low pressures (300 to 1100 psia) and low velocities (14 to 67 ft/sec). Data on the heat-transfer characteristics of 98% H₂O₂ at pressures up to 5000 psia and velocities up to 200 ft/sec are needed for evaluating regenerative cooling designs for high-pressure, high-heat-flux systems.

In the present investigation, 24 heat-transfer tests were conducted with 98% H₂O₂ in electrically heated round tubes with uniform heat-flux distribution. The ranges of conditions encountered in these tests were:

Pressure, psia	830 to 4700
Velocity, ft/sec	25 to 200
Bulk Temperature, °F	40 to 215
Heat Flux, Btu/in. ² sec	Up to 48

Thirteen of these tests were burnout tests, in which the burnout or ultimate heat flux was evaluated in electrically heated round tubes by increasing the heat flux in increments, at a fixed flow rate and at fixed pressure conditions, until failure of the tube occurred. Data on the forced-convection heat-transfer characteristics were also obtained at each heat-flux level below the burnout point.

The remaining 11 of the 98% H₂O₂ tests were extended-duration tests in which a constant heat-flux level was maintained for durations up to ten minutes. This extensive investigation of duration effects was initiated when it was found that burnouts occurred during extended operation at significantly lower heat fluxes than during the shorter-duration burnout tests.

I, Introduction and Summary (cont.)

Seven tests to determine the pressure-drop characteristics of 98% H₂O₂ at isothermal and heated conditions were also conducted.

Heat-transfer tests with 90% H₂O₂ and deionized water were conducted in addition to the 98% H₂O₂ testing. The burnout heat flux of 90% H₂O₂ was evaluated in four tests at a nominal pressure of 4000 psia, with velocities from 45 to 135 ft/sec, bulk temperatures from 140 to 205°F, and at heat fluxes up to 36 Btu/in.² sec.

Testing with deionized water consisted of two burnout tests and of one extended-duration test. The water burnout tests served as loop-checkout tests, and the extended-duration test with water provided a comparison to the results of the 98% H₂O₂ extended-duration tests. Water testing was done at velocities from 38 to 150 ft/sec, pressures from 1000 to 3000 psia, and bulk temperatures from 120 to 285°F with heat fluxes up to 28 Btu/in.² sec. Sections of the burned-out tubes were subjected to metallographic analysis to determine the surface changes that occurred (Appendix A).

All testing was done on Aerojet-General's high-pressure, storable-propellant heat-transfer loop. This "blowdown" type loop is pressurized with a nitrogen system capable of operating at 10,000 psia. The liquid run tank can operate at pressures up to 5500 psia. Electrical power for preheating the 98% H₂O₂ and for applying a heat flux to the test section is provided by a 200-kW-rated dc power source.

II.

TECHNICAL DISCUSSION

II.

TECHNICAL DISCUSSION

This section contains descriptions of the experimental apparatus, of the types of tests conducted, of the test procedures used, and of the method of data analysis. A discussion of the results obtained is also included.

A. EXPERIMENTAL APPARATUS

1. High-Pressure Heat-Transfer Loop

All tests were conducted on Aerojet-General's high-pressure "blowdown" heat-transfer loop shown schematically in Figure 1. The main components of the loop are the pressurization system, the run-tank assembly, the preheater-test section assembly, the heat exchanger, the flow-control valve, and the dump-tank assembly. Electrical power for the preheater-test section assembly is provided by four 15-v power supplies rated at 50 kw dc each.

The pressurization system, shown in Figure 2, consists of an 18-ft³ 10,000-psig-rated nitrogen storage vessel, of a high-pressure booster pump, and of associated piping and valve components. The run-tank assembly consists of a 115-gal 5500-psig-rated 321 stainless-steel spherical vessel, of piping and valve components, and of a control system which allows remote operation. Three interconnected 42-gal 2000-psig-rated spherical stainless-steel vessels make up the dump-tank system. The electrically operated flow-control valve is located upstream of the dump tanks. The run tank and the dump-tank assemblies are shown in Figure 3.

The preheater-test section assembly consists of a 150-kw-rated preheater coil constructed from 1/2-in.-OD by 0.058-in.-thick stainless-steel tubing, of a test-section mounting stand with attached copper bus-bar clamps for holding the test section in place; of inlet and outlet fluid-mixing sections; and of a stand for mounting pressure transducers and the thermocouple ice bath. A water-cooled, multi-pass, shell and tube-type heat exchanger is located downstream of the test section. The preheater-test section assembly and the heat exchanger can be seen in Figures 3 and 4.

2. Test Sections

Test sections were constructed from 1/4- and 3/16-in.-OD tubing with wall thicknesses from 0.015 to 0.016 in. The tube material was Inconel 718 for the majority of the tests, but some testing was done with 347 stainless-steel tubing. The basic configuration of a test section is shown in Figure 5. Dimensions of the test sections used in each test are given in Table I.

The heated lengths of the test sections were formed by silver-brazing two predrilled copper cylinders onto the tubing. These copper cylinders

II, A, Experimental Apparatus (cont.)

fit the copper bus-bar clamps. Fittings for connecting the test section to the mixing sections and to the transducer lines were then installed, together with the wall-temperature and voltage tap instrumentation. An unheated entrance length of 5 in. (yielding length-to-diameter, L/D, ratios of 23 and 31 for the 1/4- and 3/16-in.-OD tubing, respectively) was maintained on all test sections. Figure 6 shows a completed test section installed on the mounting stand.

3. Passivation Procedure

Prior to testing with 98% H₂O₂, the heat-transfer loop was thoroughly passivated. Passivation was accomplished in the following sequence: (1) the system was cleaned with solvents and flushed with deionized water; (2) 70% nitric acid was flushed through the system and left in the tanks and lines for 24 hr; (3) the system was flushed with deionized water; (4) the entire system was filled with 35% H₂O₂, was left full for about 60 hr, and was then drained; (5) the run tank was filled with 98% H₂O₂.

Test sections were also passivated prior to installation by filling the sections with 70% nitric acid and allowing the acid to remain in the tubes for four hours. The tubes were then flushed with deionized water and purged with nitrogen.

4. Instrumentation

The following measurements were made in each test:

- a. Test-section outer wall temperature (at two or three axial positions),
- b. Test-section inlet and outlet bulk temperature,
- c. Flow rate,
- d. Test-section inlet and outlet pressure,
- e. Test-section current,
- f. Overall test-section voltage drop, and
- g. Voltage levels at incremental distances along the test section.

In addition, test-section pressure drop was measured in seven pressure-drop tests. The accuracy of the data was enhanced by taking redundant measurements whenever possible. Average readings of these measurements were used in evaluating the data.

II, A, Experimental Apparatus (cont.)

Test-section outer wall temperatures were measured with 40-gage chromel-alumel thermocouples installed upon a 0.0005-in.-thick layer of mica. They were held in place by an overwrap of glass roving. The accuracy of these measurements was evaluated by comparing the readings from two thermocouples placed opposite each other at each axial position where a wall-temperature measurement was desired. The data indicated agreement within 20 to 100°F at wall temperatures from 500 to 1500°F.

Both the inlet and the outlet bulk temperatures were measured with three copper-constantan immersion-type thermocouples installed downstream of the mixing baffles in the fluid-mixing sections. Agreement between the readings of the three thermocouples was generally within 2°F.

Flow-rate measurements were obtained from two turbine-type flow meters connected in series upstream of the preheater. Agreement between these two meters was consistently within 1.5%.

Test-section inlet and outlet pressures were measured with transducers connected to pressure-tap fittings upstream and downstream of the test-section electrical connections. Readings from these two transducers consistently agreed within 2% at the no-flow data point recorded in each test after system pressurization had been achieved. Test-section pressure-drop measurements were obtained using 0-to-100-psi and 0-to-500-psi pressure-drop transducers.

Overall test-section voltage drop was measured between the test-section electrodes. Incremental voltage levels along the test-section tube were also measured with voltage taps, which consisted of 0.005-in.-dia wire that was spot-welded to the tube. Agreement between these voltage measurements was good, and a linear voltage relationship was found to exist along the test section.

Test-section current was measured with a 50-mv shunt. The accuracy of this measurement was good, as indicated by the overall energy balances calculated for each test, which generally compared within 10% for short-duration variable-heat-flux tests and within 4% for long-duration constant-heat-flux tests.

B. TESTING

Three types of tests were conducted: (1) burnout tests, (2) extended-duration tests, and (3) pressure-drop tests. These tests are discussed separately in the following paragraphs.

II, B, Testing (cont.)

1. Burnout Tests

The objective of the burnout tests was to determine the burnout heat flux and the forced-convection characteristics of 98% H₂O₂ at given pressures, velocities, and bulk temperatures. In these tests, the heat flux was increased stepwise until the test section burned out. Forced-convection data were obtained at each heat-flux level up to the point of burnout. The duration of these tests was typically from three to four minutes. During this time, heat fluxes ranging from zero to the burnout value were applied to the test section.

Thirteen burnout tests were conducted with 98% H₂O₂, four with 90% H₂O₂, and two with deionized water (loop-checkout tests).

2. Extended-Duration Tests

Tests with extended durations at a constant heat flux were also conducted. The objective of these tests was to determine whether the burnout heat-flux limits established for 98% H₂O₂ in the burnout tests of relatively short duration were applicable for operation at longer durations. In these extended-duration tests, a predetermined heat flux was applied to the test section after the desired flow conditions had been established, and the system was then allowed to operate at steady-state conditions until the desired duration (ranging from 5 to 10 min) had been achieved or until burnout of the test section occurred.

Twelve extended-duration tests were conducted: eleven with 98% H₂O₂ and one with water.

3. Pressure-Drop Tests

Testing with 98% H₂O₂ included tests to evaluate pressure-drop characteristics at isothermal and heated conditions. Seven of these tests were conducted.

C. TEST PROCEDURES

Prior to testing, the high-pressure GN₂ receiver was pressurized to 10,000 psi by utilizing a boost-pump system. Next, the dump tanks were vented, the drain lines were closed, water flow in the heat exchanger was initiated, and the system was pressurized to a predetermined level.

The desired flow rate and outlet pressure for the test section was then initiated and controlled by slowly opening the electrically operated

II, C, Test Procedures (cont.)

flow-control valve. When the desired flow conditions had been achieved, power was applied to the preheater and the test-section inlet temperature was adjusted to the desired value. Test-section power was then raised to a predetermined level, and the wall temperature of the section was monitored on a visual gage to determine when steady-state conditions were obtained (the time required to achieve steady state was generally about 10 sec). All pertinent data were then recorded automatically on magnetic tape and oscillograph paper.

In the burnout tests, test-section power was slowly increased to a higher level and, as soon as steady-state had been achieved, the data-taking process was repeated. This step-wise increase in heat flux was repeated until burnout of the test section occurred.

The heat flux initially applied to the test section was not changed during the long-duration tests, and the system was maintained at steady state for a specified time or until the test section burned out. The high-pressure tests (outlet pressure > 2000 psia) with durations exceeding five minutes were conducted in two blowdowns of the loop.

The pressure-drop tests were conducted in essentially the same manner as the burnout and long-duration tests except that during the start sequence the system was pressurized more slowly and with the flow-control valve slightly open to avoid an excessive pressure difference across the pressure-drop transducers.

D. DATA REDUCTION

The data obtained during these tests were reduced using Aerojet-General's data-reduction computer program, Program 22105 (5). The outputs from this program for the 98% H₂O₂ and 90% H₂O₂ tests are given in Appendix B.

Local values of heat-transfer coefficient were calculated from the relationship:

$$h = \frac{q}{T_i - T_B}$$

where:

h = heat-transfer coefficient, Btu/in.²sec °F

q = local heat flux, Btu/in.²sec

T_i = inside tube wall temperature, °F

T_B = local bulk temperature, °F

II, D, Data Reduction (cont.)

Values of heat flux were calculated from electrical power measurements and from the tube geometry:

$$\dot{Q} = \frac{C A E}{\pi (ID)(\Delta L)}$$

where:

E = voltage drop

I = current, amp

ID = inside tube diameter, in.

ΔL = length between voltage taps, in.

$C = 0.000948 \frac{\text{Btu/sec}}{\text{watt}}$

Inner-wall temperatures were evaluated assuming radial conduction and no heat transfer at the outer tube wall. The thermal conductivity and the electrical resistivity of the tube wall were considered as functions of temperature. The differential equation (6) for this condition is:

$$\frac{d^2T}{dr^2} + \frac{1}{r} \frac{dT}{dr} + \frac{1}{k} \frac{dT}{dr} \frac{dk}{dr} = \frac{-CAE^2}{\rho_e k \Delta L^2}$$

where:

T = temperature, °F

r = radius, in.

k = tube-wall thermal conductivity, Btu/sec in.°F

ρ_e = tube-wall electrical resistivity, ohm-in.

Substitution of the expressions:

$$\frac{dT}{dr} = \frac{T_{n-1} - T_n}{\Delta r}$$

$$\frac{dk}{dr} = \frac{k_{n-1} - k_n}{\Delta r}$$

II, D, Data Reduction (cont.)

and

$$\frac{d^2T}{dr^2} = \frac{T_{n+1} - 2T_n + T_{n-1}}{(\Delta r)^2}$$

into the differential equation yields the finite-difference equation from which the inside tube-wall temperature was calculated:

$$T_{n+1} = T_n - (T_{n-1} - T_n) \left[\frac{\Delta r}{r_n} + \frac{k_{n-1} - k_n}{k_n} + 1 \right]$$

$$4. \frac{CAB^2 \Delta r^2}{k_n \rho_e n \Delta L^2}$$

where:

n+1, n, n-1 refer to adjacent radial increments of thickness Δr . The values of k and ρ_e used for Inconel 718 and 347 stainless steel are shown in Figure 7 and were taken from References 7, 8, and 9. Local bulk temperature was calculated assuming uniform power input along the length of the test section, i.e.,

$$T_B = T_{Bin} + (T_{Bout} - T_{Bin}) \frac{(L-X)}{L}$$

where:

T_{Bin} = inlet bulk temperature, °F

T_{Bout} = outlet bulk temperature, °F

L = heated length of test section, in.

X = distance from downstream end of heated length, in.

The local pressure was calculated from a similar expression:

$$P = P_{in} - (P_{in} - P_{out}) \frac{(L-X)}{L}$$

where:

P_{in} = inlet pressure, psia

P_{out} = outlet pressure, psia

II, D, Data Reduction (cont.)

The dimensionless forced-convection correlating parameters listed below were evaluated at the local bulk temperature and at the average film temperature:

$$Nu = \text{Nusselt Number} = \frac{h d_e}{k}$$

$$Re = \text{Reynolds Number} = \frac{Vd_e \rho}{12\mu}$$

$$Pr = \text{Prandtl Number} = \frac{\mu C_p}{12 k}$$

where:

V = velocity, ft/sec

d_e = equivalent diameter, in.

ρ = density, lbm/ft³

μ = viscosity, lbm/ft-sec

C_p = specific heat, Btu/lbm°F

The overall reliability of the data was evaluated by performing an energy balance for the test section:

$$\text{Energy Balance} = \frac{Q_{in} - Q_{out}}{Q_{in}}$$

where:

Q_{in} = electrical energy input to the fluid, Btu/sec

Q_{out} = sensible energy transferred to the fluid, Btu/sec

The input energy was calculated from

$$Q_{in} = 0.000948 E_T I$$

where:

E_T = total test-section voltage drop,

I = test-section current, amp

II, D, Data Reduction (cont.)

and output energy was calculated from:

$$Q_{out} = \dot{W} \left[\bar{C}_p (T_{out} - T_{Bin}) + \frac{(v_{out})^2 - (v_{in})^2}{2 g J} - \Delta T_o \right]$$

where:

\dot{W} = flow rate, lbm/sec

\bar{C}_p = average specific heat, Btu/lbm°F

g = 32.174 lbm ft/lbf sec²

J = 778 ft lbf/Btu

The term ΔT_o is the bulk-temperature rise observed before application of test-section power. This temperature rise is caused by frictional heating and was observed to increase with velocity. Incorporation of this term into the energy balance also provides a zero correction for the inlet and outlet bulk-temperature thermocouples. Values of ΔT_o ranging from 0.2 to 5.0°F were observed at velocities from 25 to 200 ft/sec.

E. DISCUSSION OF RESULTS

1. 98% H₂O₂

a. Burnout Heat Flux

(1) Burnout Test Results

Thirteen burnout tests were conducted with 98% H₂O₂, in which burnout heat fluxes from 8.1 to 48.2 Btu/in.²sec were encountered. Eight of these tests were conducted at pressures above the critical pressure of 3220 psia. In these tests, test-section outlet pressures ranged from 3500 to 4700 psia, velocities from 25 to 200 ft/sec, and bulk temperatures from 140 to 235°F. The remaining five burnout tests were conducted at subcritical pressure levels of 3000 and 850 psia, velocities from 50 to 170 ft/sec, and bulk temperatures from 150 to 190°F. The results of the 98% H₂O₂ burnout tests are summarized in Table II.

The burnouts observed in these tests occurred within about one inch of the downstream end of the test section. This location of the burnout point is typical and has been observed with many fluids. Two types of burnout were observed, the most common being a complete severance burnout in which failure of the tube wall occurred in a fairly even plane roughly perpendicular to the axis of the test section. In addition, splitting of the

II, E, Discussion of Results (cont.)

tube in the longitudinal direction downstream of the severance point usually occurred. Local melting on the outside of the tube at the point of severance was observed on all complete severance burnouts. Heat marks (purple-hued discolorations) were consistently observed on the inside of the tube along the edges where tube failure occurred. Typical complete severance burnouts with and without tube splitting are shown in Figures 8 and 9. The most explosive burnout occurred during Test HT-4-109 where complete severance occurred in two locations, as shown in Figure 10.

In two of the burnout tests, a tube-split failure occurred, as shown in Figure 11. These failures were accompanied by bulging of the test section in the region of the split and by heat marks on the inside of the tube. No melting of the tube wall was observed.

It is apparent that burnout resulted from a sudden excursion in tube-wall temperature since outer tube-wall temperatures ranging from 850 to 1700°F were observed just prior to burnout.

A satisfactory correlation of the burnout test results is obtained by plotting burnout heat flux as a function of velocity. The data reported in Reference 2 for pressures from 300 to 1000 psia and bulk temperatures from 213 to 298°F also correlate well. As shown in Figure 12, the variation is essentially linear, and a good representation of the data is obtained with:

$$\phi_{BC} = 0.24 V \quad (\text{Eq 1})$$

No significant effect of pressure or bulk temperature is evident. All but one of the data points are within 2 Btu/in.² sec and at velocities greater than 40 ft/sec are within 10% of the values predicted by Equation 1. All the data correlate within 25% for the general range of conditions:

$$P = 300 \text{ to } 4700 \text{ psia}$$

$$V = 14 \text{ to } 198 \text{ ft/sec}$$

$$T_b = 137 \text{ to } 298^\circ\text{F}$$

The burnout obtained in Test HT-4-139 appears low in comparison to the rest of the data and lies about 25% below the line given by Equation 1. This suggests an effect of material since Test 139 was the only test conducted with a 347 stainless-steel test section instead of an Inconel 718 test section. However, the agreement of the data given in Reference 2 for 316 stainless-steel test sections with the data points for Inconel 718 tubing tends to negate this effect.

II, E, Discussion of Results (cont.)

The data obtained at subcritical pressures also correlate with the product of velocity and subcooling (ΔT_{sub}), as shown in Figure 13, from which the following equation is derived:

$$\phi_{B0} = 2.5 + 0.00034(\Delta T_{\text{sub}}) \quad (\text{Eq } 2)$$

where:

$$\Delta T_{\text{sub}} = T_{\text{sat}} - T_B, ^\circ\text{F}$$

T_{sat} = saturation temperature, $^\circ\text{F}$ (boiling point at operating pressure)

This type of correlation has been found to be applicable to a wide variety of subcritical fluids at high velocity and high subcooling (ΔT_{sub}) conditions (discussed in References 10, 11, and 12). Equation 2 does not yield a more precise prediction of the subcritical pressure data because deviations of up to 30% are present.

However, the applicability of Equation 2 to the 98% H_2O_2 data is questionable because this type of correlation was established for burnout caused by the transition from nucleate to film boiling. Nucleate boiling apparently did not occur in the 98% H_2O_2 subcritical-pressure tests, as evidenced by the relationship between heat flux and wall temperature shown in Figures 14 through 17. The slope in heat flux is not steep, as in nucleate boiling, and this indicates that a convective heat-transfer mechanism was present up to the point of burnout. Furthermore, these data indicate that burnout occurred at wall temperatures below the saturation temperature (boiling point). Calculated wall temperatures at burnout ranged from 350 to 400 $^\circ\text{F}$ at 850 psia ($T_{\text{sat}} = 655^\circ\text{F}$) and from 500 to 600 $^\circ\text{F}$ at 3000 psia ($T_{\text{sat}} = 850^\circ\text{F}$).

The lack of a boiling phenomenon was also noted in the data reported in Reference 2; however, these data indicated that wall temperatures at burnout exceeded the saturation temperature by as much as 300 $^\circ\text{F}$. The discrepancy between the two sets of data has not been explained. Comparison of inner-wall temperatures calculated from water checkout test data with the temperatures given by the superheat correlations developed for water by Bernath (13) and by Jens and Lottes (14) indicate that the inner-wall temperatures obtained in this investigation are low by about 100 to 150 $^\circ\text{F}$, as shown in Figure 18. This error is not sufficiently large to explain the difference between the wall temperatures obtained for 98% H_2O_2 in this investigation and those reported in Reference 2.

The tests at supercritical pressure yielded the same relationship between heat flux and wall temperature as the tests at subcritical pressure. A normal, convective heat-transfer mechanism is

II, E, Discussion of Results (cont.)

evidenced up to the point of burnout, as shown in Figures 19 through 24. This type of relationship has also been observed for AeroZINE 50 at supercritical pressures.

(2) Extended-Duration Test Results

Twelve extended-duration tests were conducted: eleven with 98% H₂O₂ and one with deionized water. These tests were conducted at velocities of 50, 100, and 150 ft/sec at pressures from 830 to 3700 psia, and at bulk temperatures ranging from 115 to 155°F. Inconel 718 test sections were employed in the high-pressure tests (2800 to 3700 psia), whereas a 347 stainless-steel test section was used for low-pressure testing. The results of these tests are summarized in Table III and Figure 25.

Six of the 98% H₂O₂ extended-duration tests terminated in test-section burnout at heat fluxes that were 20 to 35% lower than the burnout values given by the velocity correlation (Equation 1) established from the results of burnout tests at relatively short duration. Burnouts were observed at 50, 100, and 150 ft/sec, as shown in Figure 25. The time interval from start of steady state to burnout ranged from 50 sec to 8.3 min.

Testing with 98% H₂O₂ in Inconel 718 test sections (eight tests, five burnouts) at pressures of 2800 to 3700 psia resulted in burnout whenever the heat flux exceeded 65% of the burnout heat flux given by Equation 1. At heat fluxes below this critical level, durations of up to ten minutes were achieved without burnout.

Somewhat different extended-duration burnout characteristics were observed with a stainless-steel test section at lower pressure (P = 850 psia). Tests HT-4-140, -141, and -142 were conducted with a stainless-steel test section at the same flow conditions as the stainless-steel burnout test (Test 139) discussed earlier. During extended duration testing, burnout did not occur until the maximum heat flux observed in the burnout test (Test 139) was attained. This corresponds to about 75% of the value given by Equation 1. These maximum heat flux results obtained with stainless-steel tubes are what is normally expected because burnout-heat-flux limits are not usually related to duration. A general agreement between burnout-heat-flux limits of 98% H₂O₂ in short-duration and in extended-duration tests has also been noted in Reference 2 for 316 stainless-steel test sections, at a velocity of 15 ft/sec and at a pressure of 300 psia. However, Reference 4 reports anomalous behavior (e.g., transient and recurrent wall-temperature peaks) in some extended-duration tests with stainless-steel test sections.

II, E, Discussion of Results (cont.)

Again, indications are that the material may affect the burnout heat flux of 98% H₂O₂. However, tests with Inconel 718 at low pressures and with stainless steel at high pressure are needed to evaluate the effect of pressure on the maximum heat flux for extended duration.

The fact that extended-duration burnouts are a unique characteristic of 98% H₂O₂ was demonstrated by conducting a test with deionized water and an Inconel 718 test section (Test 144A, B) at the velocity, pressure, and heat-flux conditions of extended-duration tests with 98% H₂O₂ that resulted in two burnouts. This test had a duration of 11 min, and no burnout occurred.

An extended-duration test was also conducted with an Inconel 718 test section that was cleaned but not passivated (Test HT-4-143A,B). This test had a duration of 6.5 min at a heat flux about 60% of that given by Equation 1; no burnout occurred.

All the extended-duration burnouts occurred at heat fluxes equal to or greater than 65% of the Equation 1 value. Thus:

$$\phi_{BO} = 0.16 V \quad (\text{Eq 3})$$

appears to represent a good upper limit for safe extended-duration operation with 98% H₂O₂ and is recommended for design purposes.

(3) Burnout Mechanism

Burnouts with fluids at subcritical pressures are normally related to the transition from nucleate to film boiling, whereas most burnouts with fluids at supercritical pressure appear to result from a degradation of the heat-transfer coefficients when the properties of the fluid near the wall begin to change rapidly. These two mechanisms are entirely different, and the burnout data at these two pressure levels cannot be expected to correlate. The fact that the burnout data for 98% H₂O₂ correlate over such a wide range of pressures (300 to 4700 psia--roughly 10 to 150% of the critical pressure) suggests that H₂O₂ burnout is governed by a mechanism other than film-boiling or variations in fluid properties.

The burnouts obtained with 98% H₂O₂ appear to be the result of a sudden deterioration of the normal forced-convective heat-transfer mechanism caused by exothermic decomposition:



$$\Delta H = 23.4 \text{ Kcal/mole}$$

II, E, Discussion of Results (cont.)

A relationship between the burnouts and decomposition is indicated by the energy-balance calculations performed for the burnout and extended-duration tests. In the burnout tests, the energy balances tended to become increasingly negative as burnout was approached. By definition, a negative energy balance indicates an excess of sensible energy (Q_{out}) over the input electrical energy (Q_{in}). Such an excess in sensible energy was indicated at the burnout point in each of the burnout tests. As shown in Table II, the amount of excess energy ranged from 1.5 to 23%. Typical examples of the manner in which the apparent energy excess increased as burnout was approached are shown in Figure 26.

The energy balances for the extended-duration tests in which burnout occurred also indicate an increasing excess of sensible energy as burnout is approached. The magnitude of excess energy is somewhat less than observed in the burnout tests, ranging from 1.5 to 6%. As shown in Figures 27 through 32, a slowly increasing excess in sensible energy is indicated for each extended-duration test that terminated in burnout. Significantly, the energy balances for the extended duration tests where no burnout occurred do not show such a perceptible trend towards excess sensible energy. This is demonstrated in Figures 33 through 38.

The amounts of excess energy indicated at burnout are small and generally within the $\pm 10\%$ energy balance tolerance normally considered sufficient to ensure reliable heat-transfer data. However, the fact that this small excess was consistently observed prior to burnout is strong evidence that burnout is caused by exothermic decomposition of the 98% H_2O_2 .

Comparison of the heat of reaction (Equation 4) to the energy balances at burnout indicates that only 0.1 to 0.6% of the 98% H_2O_2 need decompose to yield the indicated excess energy. This is consistent with the fact that no large-scale H_2O_2 decomposition was observed throughout the course of testing. The lowest concentration measured was 96.3%, as shown in Table IV.

The onset of the decomposition which causes burnout is apparently quite sudden. In most of the tests, no degradation of the heat-transfer coefficient was observed prior to burnout. Only a slight degradation was indicated for some of the burnout tests and in four of the extended-duration tests which terminated in burnout. This degradation is evidenced by an increasing inner-wall temperature at relatively constant heat flux and velocity conditions, as shown in Figure 17 for Test HT-4-110 (burnout test) and in Figure 27 for Test HT-4-130 (extended-duration test).

II, E, Discussion of Results (cont.)

A plausible qualitative explanation of the 98% H₂O₂ burnout mechanism is obtained by considering a discrete packet of fluid which comes into contact with the heated wall for a certain period of time, δ , and is heated from its initial temperature, T_B (the bulk temperature of the main stream), to a new temperature T_{B'}.

$$T_{B'} = T_B + \frac{\phi \delta A_c}{C} \quad (\text{Eq 5})$$

where:

ϕ = heat flux, Btu/in.²sec

δ = contact time, sec

A_c = effective contact area, in.²

C = thermal capacity of fluid packet, Btu/^oF

The packet then joins the main fluid stream and contributes to an increase in bulk temperature.

It is conceivable that a chemical decomposition begins when the temperature of the fluid packet reaches a certain value. If sufficient mixing occurs as a result of turbulence, a small amount of this decomposition can be quenched in the mainstream. Previous analyses (15) have shown that up to 0.5% of the decomposition products of 98% H₂O₂ can be dissolved in the mainstream at high pressures. This would account for the excess sensible energies observed prior to burnout. Eventually, as the heat flux is increased, the exothermic decomposition overcomes the turbulent quenching process, and high-temperature decomposition products suddenly cover the tube wall locally. Burnout is the result because of the drastic reduction in the liquid-side heat-transfer coefficient.

Equation 5 indicates that the temperature rise of a given fluid packet depends on the heat flux, ϕ , and on the contact time, δ . The contact time can be expected to decrease with an increased intensity of turbulence. Therefore, it is logical that the contact time would decrease with increased velocity. Consequently, at higher velocities, higher heat fluxes are required to raise the temperature of the packet to the point where excessive decomposition begins. This is consistent with the observed correlation between burnout heat flux and velocity; i.e., the heat flux at which burnout occurred was found to increase with velocity.

II, E, Discussion of Results (cont.)

It is not known why burnout in the extended-duration tests occurred at lower heat fluxes than expected; possibly, it may have been caused by microscopic changes in the surface of the tube walls which catalytically promoted the exothermic decomposition of H_2O_2 . However, examination of burned-out test sections revealed no obvious changes of the surfaces. (See Appendix A for further discussion.)

If the extended-duration burnouts are caused by microscopic changes in the exposed surface of the tubes, the tube material, the surface finish, and the passivation technique may be important factors affecting the burnout heat flux. The tests conducted during this investigation appear to confirm that a material effect exists, as shown by the different results obtained with Inconel 718 and stainless-steel tubing. However, a pressure effect may also exist and additional tests with Inconel 718 at low pressures and a stainless steel at high pressures are needed to clarify the influence of material and pressure on 98% H_2O_2 burnout heat flux. Testing with an unpassivated (but thoroughly cleaned) Inconel 718 test section (Test 143) indicated that nitric-acid passivation does not yield significantly different extended-duration burnout limits with this material. Alternative passivation techniques should be investigated for future testing.

b. Forced Convection

Local values of heat flux, inner-wall temperature, and heat-transfer coefficient calculated at each test-section thermocouple station and for each power level of the 98% burnout tests are given in Appendix B.

The data are correlated in terms of the Nusselt, Reynolds, and Prandtl numbers in Figures 39 and 40. Data points having energy balances greater than $\pm 10\%$ are not shown.

As shown in Figure 39, the two most commonly used bulk-temperature property equations do not correlate the test data very well. The most generally accepted correlation for high-velocity heat transfer is that developed by Hines (16):

$$Nu_b = 0.005 Re^{0.95} Pr^{0.4} \quad (\text{Eq } 6)$$

A plot of this correlation passes through the center of the data, but deviations up to 80% are present. Part of this deviation is caused by L/D effects. The data for L/D > 20 correlate within $\pm 40\%$.

The Dittus-Boelter correlation (17):

$$Nu_b = 0.023 Re_b^{0.8} Pr_b^{0.4}$$

II, E, Discussion of Results (cont.)

yields conservative values for heat-transfer coefficients that will be sufficient for most design applications.

Use of average film-temperature properties does not improve the correlation, as shown in Figure 40. A Dittus-Boelter type equation evaluated with average film properties passes through the center of the data; however, deviations of +70% and -40% exist.

The correlation presented in Reference 18:

$$\text{Nu} = (\text{Nu}') \left(\frac{\mu_b}{\mu_w} \right)^{0.11} \left(\frac{k_b}{k_w} \right)^{-0.33} \left(\frac{\bar{C}_p}{C_{pb}} \right)^{0.35} \quad (\text{Eq } 8)$$

where:

$$\text{Nu}' = \frac{(f/8) \text{Re}_b \text{Pr}_b}{12.7 \sqrt{f/8} (\text{Pr}_b^{2/3} - 1) + 1.07}$$

$$f = [1.82 \log_{10} \text{Re}_b - 1.64]^{-2}$$

$$\bar{C}_p = \frac{\int_{T_b}^{T_w} C_p dT}{T_w - T_b}$$

is compared to the observed heat flux-inner wall temperature data in Figures 19, 20, 22, and 24. This correlation predicts the general trend of the data although in some cases significant deviations are present. A modified version of this equation may yield a more precise correlation, and it is recommended that efforts be expended to obtain such a correlation. To this end, the actual data have been included in this report as Appendix B.

c. Pressure Drop

The results of the 98% H₂O₂ pressure-drop tests are shown in Tables V and VI. In two of these tests the pressure drop was evaluated during isothermal flow with bulk temperatures of 70 and 200°F. In five tests, the pressure drop with 70°F inlet temperature was evaluated at heat fluxes ranging from zero to 75% of the burnout heat flux observed in the burnout tests. These tests were conducted at pressures ranging from 3800 to 4600 psia and velocities from 50 to 200 ft/sec. Inconel 718 test sections were used in all the pressure-drop tests.

AI, E, Discussion of Results (cont.)

Isothermal friction factors calculated from the data are shown in Figure 41 as a function of Reynolds number. These data generally agree with the standard charts for friction factor (19), but the dependency of experimental friction factor on Reynolds number is less than would be anticipated. The maximum deviation from the published curve for drawn tubing is about 18%. This discrepancy may have been caused by the fitting used to attach the pressure-transducer line to the test section (the fitting is shown in Figure 10). The fitting was observed to contract the diameter of the tube slightly in the region where it was fastened, producing a slight contraction and expansion at each end of the test section. This could conceivably yield pressure-drop characteristics different from those of a constant-diameter tube.

The ratio of pressure drop with and without heat transfer is shown in Figure 42 for velocities ranging from 55 to 188 ft/sec. Data were obtained at heat fluxes of 25, 50, and (except for Test 123) 75% of the burnout heat flux. In general, these curves are similar to those obtained for hydrazine in the nonboiling region reported in Reference 20. A certain amount of error exists in these calculated ratios because the pressure-drop measurements were obtained across heated and unheated sections of approximately equal length. The unusual behavior indicated at 98 ft/sec velocity and 400 psia pressure (Test 122) is probably a result of this error. However, the data are considered valid, and they demonstrate that heated 98% H₂O₂ does not exhibit any unusual pressure-drop characteristics.

d. Testing Difficulties

Most of the 98% H₂O₂ tests were conducted without difficulty; however, certain problems attributable to equipment failure were encountered, and these are stated in the following paragraphs as a matter of record. No explosions or detonations ever occurred simply as a result of test-section burnout.

In Test HT-4-131, an inadvertent electrical connection of the power supplies allowed current to leak through an adjacent test system and back into normally unheated portions of the high-pressure heat-transfer loop. This resulted in heating of relatively stagnant 98% H₂O₂, and ultimately caused detonations in a short length of tubing (connecting the main propellant valve to a drain valve) and in the drain lines. The test section was destroyed, apparently as a result of the pressure spikes produced by the detonations.

Test HT-4-132 was scheduled for a ten-minute duration, but was terminated after two minutes of steady power when the electrical insulator in the outlet pressure-transducer line failed and caused the 98%

II, E, Discussion of Results (cont.)

H_2O_2 in this line to heat-up and to detonate. This detonation collapsed the test-section tube at the point where the transducer line is attached, stopped the flow of 98% H_2O_2 , and caused the test section to burn out.

2. 90% H_2O_2

Four burnout tests were conducted with 90% H_2O_2 at a nominal pressure of 4000 psia, at velocities of 45 to 155 ft/sec and bulk temperatures of 140 to 205°F. The 90% H_2O_2 was obtained by diluting the 98% H_2O_2 with deionized water after completion of the 98% H_2O_2 heat-transfer tests.

The results of these tests are listed in Table VII and compared to the 98% H_2O_2 data in Figure 43 together with the low-pressure 90% H_2O_2 data presented in References 2 and 4. Figure 43 shows that the burnout heat flux of 90% H_2O_2 is essentially the same as that of 98% H_2O_2 and correlates equally well with velocity. The 90% H_2O_2 forced-convection data also agree with the 98% H_2O_2 data. No extended-duration tests were conducted with 90% H_2O_2 ; however, it is recommended that behavior similar to that observed with 98% H_2O_2 be assumed for design purposes.

3. Water

Two burnout heat-flux tests were conducted with deionized water to checkout the loop prior to 98% H_2O_2 testing. In these water tests, pressures of 1000 and 2000 psia, velocities of 38 and 48 ft/sec, and bulk temperatures of 165 and 280°F were encountered.

The results obtained in the water tests are listed in Table VII. These results are compared in Figure 44 to the high-velocity, high-subcooling burnout data obtained for distilled and deionized water in a previous investigation (Ref 21). Good agreement with the previous data is apparent, and the expression:

$$q_{BO} = 5.1 + 0.000860 (VAT_{sub})$$

yields predictions of the burnout heat flux within $\pm 20\%$.

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III.

CONCLUSIONS AND RECOMMENDATIONS

III.

CONCLUSIONS AND RECOMMENDATIONS

A. The burnout heat flux of 98% H₂O₂ at pressures from 300 to 4700 psia, bulk temperatures from 130° to 298°F, and velocities from 14 to 198 ft/sec correlates with velocity. The burnout heat fluxes observed in burnout tests of relatively short duration are predicted within about 25% by the expression:

$$q_{Bo} = 0.24 V$$

The burnout heat fluxes observed in the extended-duration tests were significantly lower than the burnout test values. The equation recommended for design:

$$q_{Bo} = 0.16 V$$

yields a value which lies below all the observed burnout points.

B. The burnouts observed with 98% H₂O₂ appear to be caused by the sudden onset of exothermic decomposition in the boundary layer. Boiling or boiling-like phenomena were not observed at subcritical or supercritical pressures.

C. The long-duration burnout heat flux of 98% H₂O₂ is possibly dependent on tube material, surface conditions, and pressure. Further investigation of these effects is recommended.

D. No chemical attack of the Inconel 718 test sections by the 98% H₂O₂ was observed.

E. The Dittus-Boelter equation:

$$\text{Nu}_b = 0.023 \text{ Re}_b^{0.8} \text{ Pr}_b^{0.4}$$

yields a conservative estimate of heat-transfer coefficients for 98% H₂O₂ and is recommended for design purposes. Precise correlation of the forced-convection data was not obtained, but the general trend of these data is predicted by an equation which includes bulk-to-wall-temperature fluid property ratios.

F. Ninety-eight percent hydrogen peroxide does not exhibit any unusual pressure-drop characteristics at isothermal or heated conditions.

G. Ninety-eight percent H₂O₂ can be used as a regenerative coolant.

H. Test results clearly indicate that 98% H₂O₂ will not detonate at burnout.

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TABLES

TABLE I
TEST-SECTION DIMENSIONS

<u>Test</u>	<u>Material</u>	<u>OD, in.</u>	<u>Heated Length, in.</u>	<u>Measured ID, in.</u>	<u>Nominal Wall Thickness, in.</u>
		<u>Nom.</u>	<u>Meas.</u>		
HT-4-105	Inc. 718	1/4	--	5.0	--
-106	347 SS	1/4	--	4.0	--
HT-4-108	Inc. 718	1/4	--	5.0	--
-109	Inc. 718	3/16	--	4.0	--
-110	Inc. 718	3/16	--	3.5	--
-111	Inc. 718	3/16	--	4.0	--
-112	Inc. 718	1/4	--	4.5	--
-113	Inc. 718	1/4	--	5.0	--
-114	Inc. 718	3/16	--	4.5	--
-115	Inc. 718	3/16	--	5.0	--
-116	Inc. 718	3/16	--	3.5	--
-117	Inc. 718	3/16	--	4.0	--
-118,-119	Inc. 718	1/4	--	5.0	--
-120 to -123,					
& -125	Inc. 718	3/16	--	5.0	--
-124	Inc. 718	1/4	--	4.0	--
HT-4-126	Inc. 718	3/16	--	5.0	--
-127	Inc. 718	3/16	--	6.0	--
-128	Inc. 718	1/4	--	5.0	--
-129	Inc. 718	1/4	--	4.0	--
HT-4-130	Inc. 718	3/16	0.1895	4.0	0.160
-132	Inc. 718	3/16	0.1895	5.0	0.160
-133A,B	Inc. 718	3/16	0.1895	4.0	0.159
-134	Inc. 718	3/16	--	4.5	--
-135	Inc. 718	3/16	0.1895	4.0	0.159
-136A,B	Inc. 718	3/16	0.1895	4.0	0.159
-137A,B	Inc. 718	1/4	0.2540	5.0	0.224
-138	Inc. 718	3/16	--	5.0	--
-139	347 SS	3/16	0.1865	4.5	0.154
-140,-141,-142	347 SS	3/16	0.1855	4.5	0.154
-143A,B	Inc. 718	3/16	0.1895	4.0	0.159
-144A,B	Inc. 718	3/16	0.1895	4.0	0.159

TABLE II
98% H₂O₂ BURNOUT TEST RESULTS

Test	P, psia	V, ft/sec	T _b , °F	Q _{b0} , Btu/in. ² sec	X, in.	Energy ^{**} Balance, %	Type of Failure
HT-4-134	840	101.5	156	22.0	0.1	-5.5	Complete severance
-139	860	106.0	147	18.6	0.1	-1.5	Complete severance
HT-4-108	3020	49.4	190	12.2	0.1	-0.0	Complete severance
-109	3020	91.0	176	19.6	1.1	-13.7	Severance in two places
-110***	2910	169.6	154	41.5	0.6	-7.1	Severance and split tube
-113	4020	25.3	137	8.1	0.65	-16.9	Split tube
-124	4150	44.6	235	9.4	0.3	-7.6	Severance and split tube
-112	3950	47.9	170	12.0	0.45	-24.0	Severance and split tube
-116	3930	91.5	156	20.7	0.65	-11.5	Severance and split tube
-111***	3860	96.5	130	24.8	0.65	-8.0	Split tube
-114	3750	161.5	144	39.6	0.1	-5.3	Complete severance
-117	3530	198.0	143	48.2	0.1	-5.5	Complete severance
-115	4700	95.5	153	23.0	0.5	-10.8	Severance and split tube

*X = Distance from burnout point to downstream end of heated section, in.

$$\text{**Energy balance} = \frac{Q_{in} - Q_{out}}{Q_{in}} \times 100\%$$

***Heat Flux based on tube resistance

TABLE III
EXTENDED-DURATION TEST RESULTS

Test Number	Flow Vol., ft/sec	Outlet Pressure, psia	Outlet Temp., °F	Heat Flux, Btu/in. ² /sec	q _{in} (2)	Inner Wall Temp., °F	Test-Section Material	Energy (k) Balance, \$	Remarks
96% & 92% TESTS									
IR-4-130	150	3300	135	28.0	60	360 to 460	Inc 718	+ 2.0 to - 7.0	Burnout after 3 min
135	150	3300	130	26.0	70	300 to 330	Inc 718	- 2.0 to - 4.0	Burnout after 50 sec
136A(1)	150	2600	115	23.0	61	360 to 460	Inc 718	0.0 to - 2.0	No burnout, 5 min steady state
136B(1)	150	2800	130	24.5	67	420 to 470	Inc 718	- 1.0 to - 4.0	Burnout after 1 min
132	150	3500 to 3600	130	20.0	56	370 to 430	Inc 718	+ 2.0 to + 0.8	No burnout, 2 min steady state
133A(1)	150	3500 to 3600	120	20.0	56	300 to 340	Inc 718	+ 0.4 to - 0.2	No burnout, 4 min steady state
133B(1)	150	3500 to 2800	120	22.5	61	360 to 470	Inc 718(3)	+ 1.0 to + 0.8	No burnout, 6 min steady state
143A(1)	150	3600 to 2800	120	22.5	61	360 to 360	Inc 718(3)	+ 1.0 to + 0.5	No burnout, 2 min steady state
143B(1)	150	3200	120	22.5	61	360 to 390	Inc 718(3)	+ 1.0 to + 3.0	No burnout, 4.5 min steady state
138	100	3500	155	16.0	67	480 to 330	Inc 718	+ 0.5 to - 5.0	Burnout after 1.7 min
140	100	850	130	13.5	53	340 to 360	Inc 718	- 0.5 to - 1.0	No burnout, 9.5 min steady state
141(1)	100	830	140	17.0	68	400 to 430	Inc 718	+ 1.0 to - 0.5	No burnout, 9 min steady state
142(1)	100	840	148	19.0	75	430 to 460	Inc 718	- 0.2 to - 1.5	Burnout after 2 min
137A(1)	50	3700	140	7.8	68	330 to 460	Inc 718	- 2.0 to 4.0	No burnout, 5 min steady state
137B(1)	50	3700	140	7.9	68	320 to 400	Inc 718	- 2.0 to - 6.0	Burnout after 3.3 min
WATER TESTS									
144A(1)	150	3000	120	28.0	N/A	260 to 320	Inc 718	+ 2.0 to 0.5	No burnout, 6 min steady state
144B(1)	150	3000	135	26.0	N/A	280 to 330	Inc 718	+ 3.0 to + 1.0	No burnout, 5 min steady state

(1) Indicates same test section as previous test.

(2) Percentage of burnout heat flux indicated by Phase-I short-duration burnout data.

(3) Test section unpassivated

$$(4) \frac{q_{in} - q_{out}}{q_{in}} \times 100\%$$

TABLE IV

 H_2O_2 CONCENTRATION DATA

<u>Test</u>	<u>Wt % H_2O_2*</u>	<u>Before Test</u>	<u>After Test</u>	<u>Date</u>	<u>Remarks</u>
MP-4-108	98.00		--	10/1/66	
-109	98.09		--	10/4	
-110	96.69		--	10/13	
-112	96.35		--	10/14	
-113	96.63		96.29	10/15	Refilled unit after Test 113.
-114	99.01		97.12	10/21	
-115	97.52		97.52	10/21	
-116	96.69		96.33	10/22	
-117	96.71		96.68	10/25	
-118	96.66		--	10/29	
-119	96.66		--	10/29	
-120	96.66		--	11/1	
-121	96.65		--	11/2	
-122	96.67		--	11/2	Fresh 98% H_2O_2 added after Test 122.
-123	96.6		--	11/3	
-124	96.85		96.67	11/4	
-125	96.68		--	11/5	Diluted for 90% H_2O_2 tests after Test 125.
-126	91.05		.72	11/10	
-127	91.04		-	11/11	
-128	90.84		--	11/12	
-129	90.03		--	11/15	
-130	98.6**		98.6**	12/17	Refilled unit prior to Test 130.
-133B	--		97.54	1/11	
-135	--		96.5	1/19	
-139	96.45		96.64	2/2	
-140	96.25		96.45	2/3	
-141	96.5		96.2	2/3	
-143B	96.45		96.35	2/7	

*Determined by titration except Test 130
**Hydrometer data

TABLE V
98% H₂O₂ ISOTHERMAL PRESSURE-DROP DATA

<u>Test</u>	<u>P_{out}, psia</u>	<u>T_b, °F</u>	<u>V, lb/sec</u>	<u>ΔP</u>	<u>ID, in.</u>	<u>Total Length, in.</u>	<u>Re_b x 10⁻⁵</u>	<u>f</u>
HT-4-118	4200	68.6	1.277	23.2	0.220	9.5	1.05	0.0191
<u>V_{nom} = 50 ft/sec</u>	--	205.1	1.197	21.3	--	--	2.50	0.0188
--	--	205.0	1.197	21.3	--	--	2.50	0.0188
--	--	70.0	1.276	23.0	--	--	1.07	0.0189
HT-4-119	4100	71.1	1.206	23.1	0.220	9.5	1.08	0.0187
<u>V_{nom} = 54 ft/sec</u>	--	71.4	1.276	22.7	--	--	1.07	0.0186
HT-4-120	4030	64.0	1.247	108.3	0.159	9.0	1.36	0.0193
<u>V_{nom} = 100 ft/sec</u>	3907	203.7	1.175	103.2	--	--	3.37	0.0195
3848	66.6	1.224	104.1	--	--	--	1.37	0.0193
HT-4-121	4000	60.7	1.198	98.1	0.159	9.0	1.26	0.0190
<u>V_{nom} = 100 ft/sec</u>	--	61.3	1.172	93.8	--	--	1.24	0.0189
HT-4-122	4613	63.7	1.181	94.9	0.159	9.0	1.25	0.0189
<u>V_{nom} = 100 ft/sec</u>	4289	64.3	1.182	95.0	--	--	1.28	0.0189
HT-4-123	3060	63.4	2.230	329.5	0.159	9.0	2.41	0.0180
<u>V_{nom} = 180 ft/sec</u>	2670	63.1	2.192	318.4	--	--	2.36	0.0180
HT-4-125	3965	65.2	2.412	377.8	0.159	9.0	2.66	0.0180
<u>V_{nom} = 200 ft/sec</u>	3470	65.7	2.253	328.6	--	--	2.48	0.0180

TABLE VI90% H₂C₂ HEATED PRESSURE-DROP DATA

<u>Test</u>	<u>P_{out}, psia</u>	<u>T_B in, °F</u>	<u>T_B out, °F</u>	<u>W, lb/sec</u>	<u>Btu/min. sec</u>	<u>Heated Length, in.</u>	<u>Unheated length, in.</u>	<u>D.ia.</u>	<u>A.P., in²</u>	<u>Total A.P.</u>	<u>(A.P.) MA</u>	<u>(A.P.) 100</u>
HT-4-119	4128	70.6	87.2	1.280	3.07	5.0	4.5	0.22	20.7	0.632		
4122		99.8	1.277	6.08					19.7	0.736		
4116		113.6	1.273	9.09					19.5	0.740		
HT-4-121	3975	59.8	77.2	1.190	4.41	5.0	4.0	0.159	89.0	0.834		
3956	60.1	95.8	1.190	9.66					87.1	0.800		
3899	59.9	112.4	1.190	14.47					85.8	0.784		
HT-4-122	4539	63.2	81.4	1.180	4.49	5.0	4.0	0.159	83.7	0.767		
4447	63.4	99.0	1.180	9.57					85.2	0.815		
4354	63.5	115.9	1.190	14.60					86.5	0.860		
HT-4-123	2819	60.5	85.6	2.260	10.89	5.0	4.0	0.159	324.3	0.940		
2733		102.1	2.240	20.33					315.6	0.920		
HT-4-125	3792	63.5	84.5	2.360	10.49	5.0	4.0	0.159	347.9	0.925		
3687		100.6	2.325	19.97					337.4	0.920		
3548		118.2	2.280	29.90					324.7	0.915		

#Calculated for the heated portion of the test section

TABLE VII
BURNOUT TEST RESULTS FOR 90% H₂O₂ AND DIIONIZED WATER

<u>Test</u>	<u>Fluid</u>	<u>P, psia</u>	<u>V, ft/sec</u>	<u>T_B, °F</u>	<u>θ_{Bo}, Btu/in.² sec</u>	<u>X, in.*</u>	<u>Energy Balance, %**</u>	<u>Type of Failure</u>
HT-4-105	Water	2000	48.1	165***	21.5	0.1	(3)	Severance
-106	Water	1020	38.0	282	14.6	0.1	+4.7	Severance
-129	90% H ₂ O ₂	3970	44.6	205	10.7	0.5	+4.3	Split tube
-128	90% H ₂ O ₂	4130	52.0	169	11.8	0.4	+4.6	Split tube
-127	90% H ₂ O ₂	3980	105.0	155	23.4	0.15	-1.5	Severance
-126	90% H ₂ O ₂	4060	155.0	141	36.1	0.1	-3.0	Severance

* X = distance from burnout point to downstream end of heated section

$$** \text{ Energy balance} = \frac{Q_{in} - Q_{out}}{Q_{in}} \times 100\%$$

*** Bulk temperature calculated from power measurements because an inadvertent sudden increase in power produced burnout before the outlet bulk-temperature thermocouples achieved steady state.

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FIGURES

Report AFRPL-TR-66-263

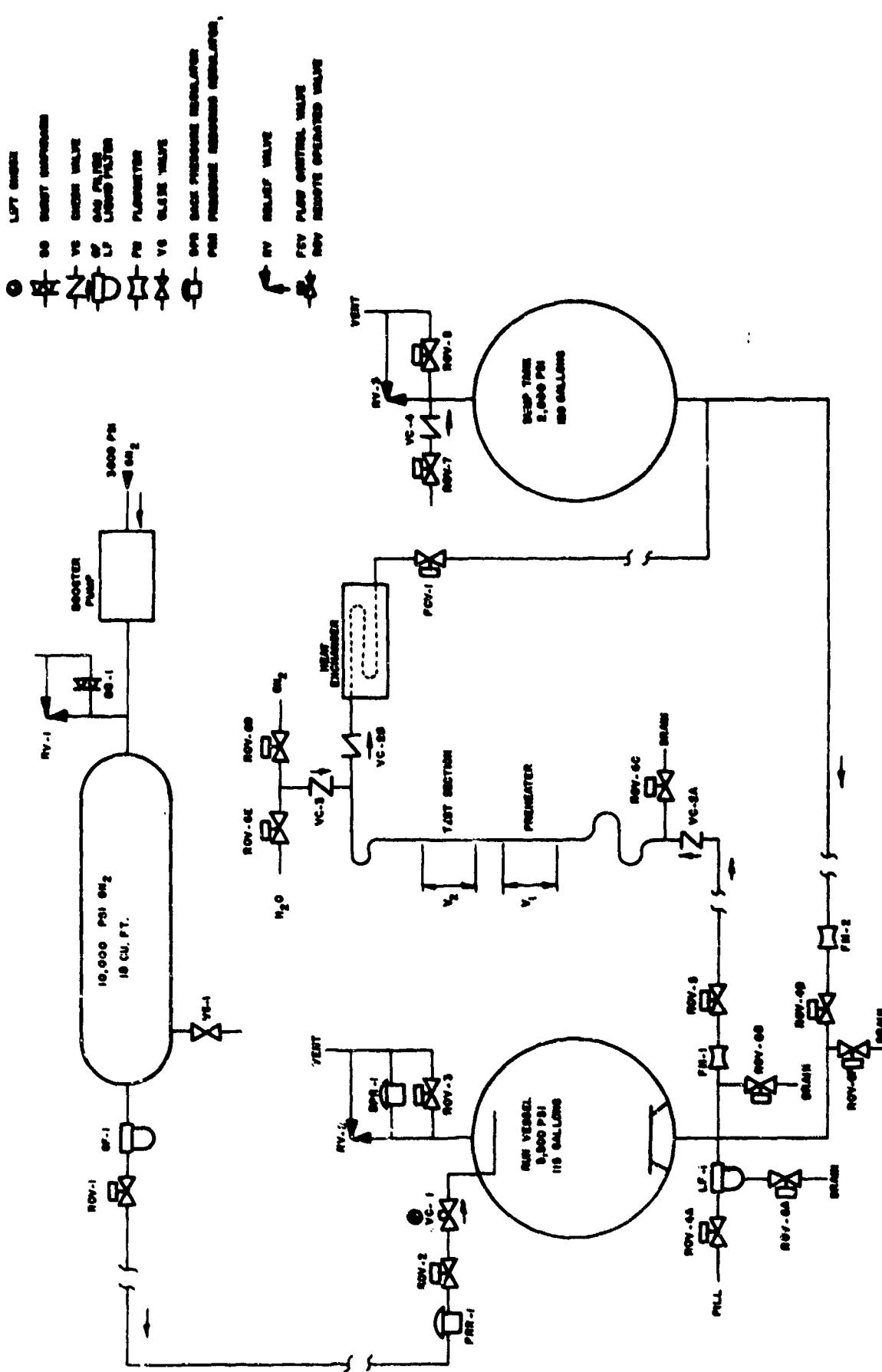


Figure 1. Schematic of High-Pressure Heat-Transfer Loop

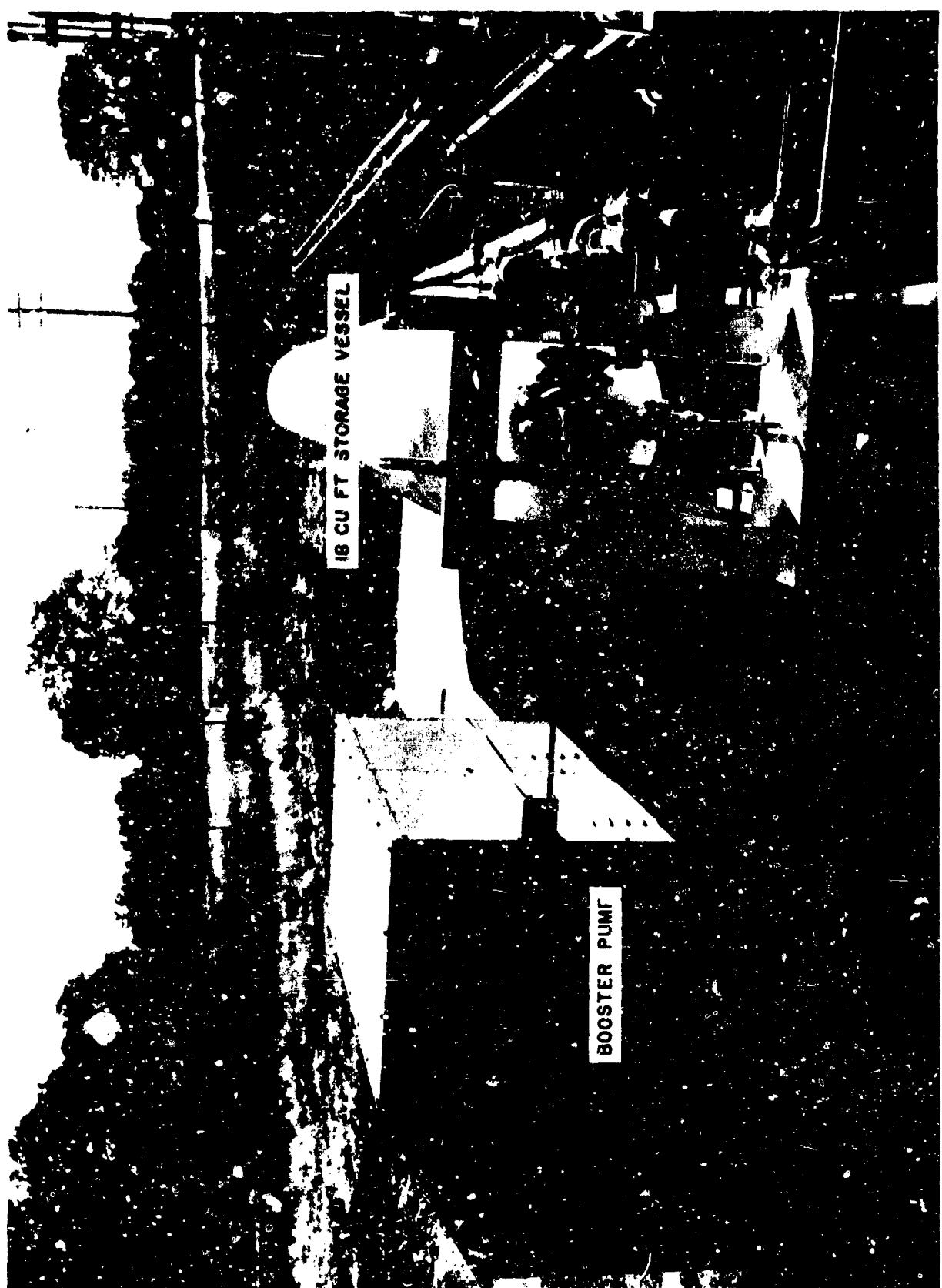


Figure 2. 10,000-psig Pressurization System

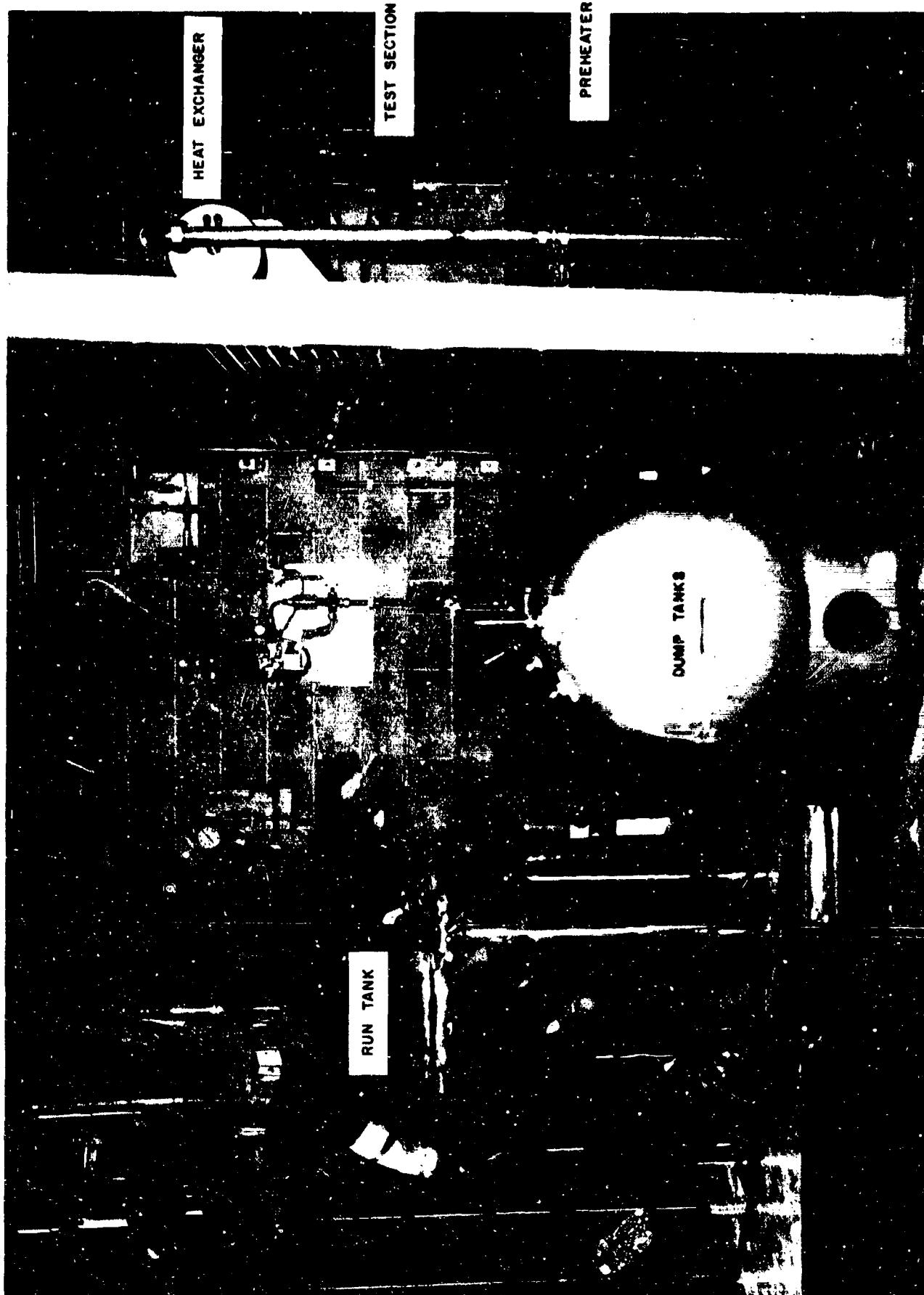


Figure 3. High-Pressure Heat-Transfer Loop

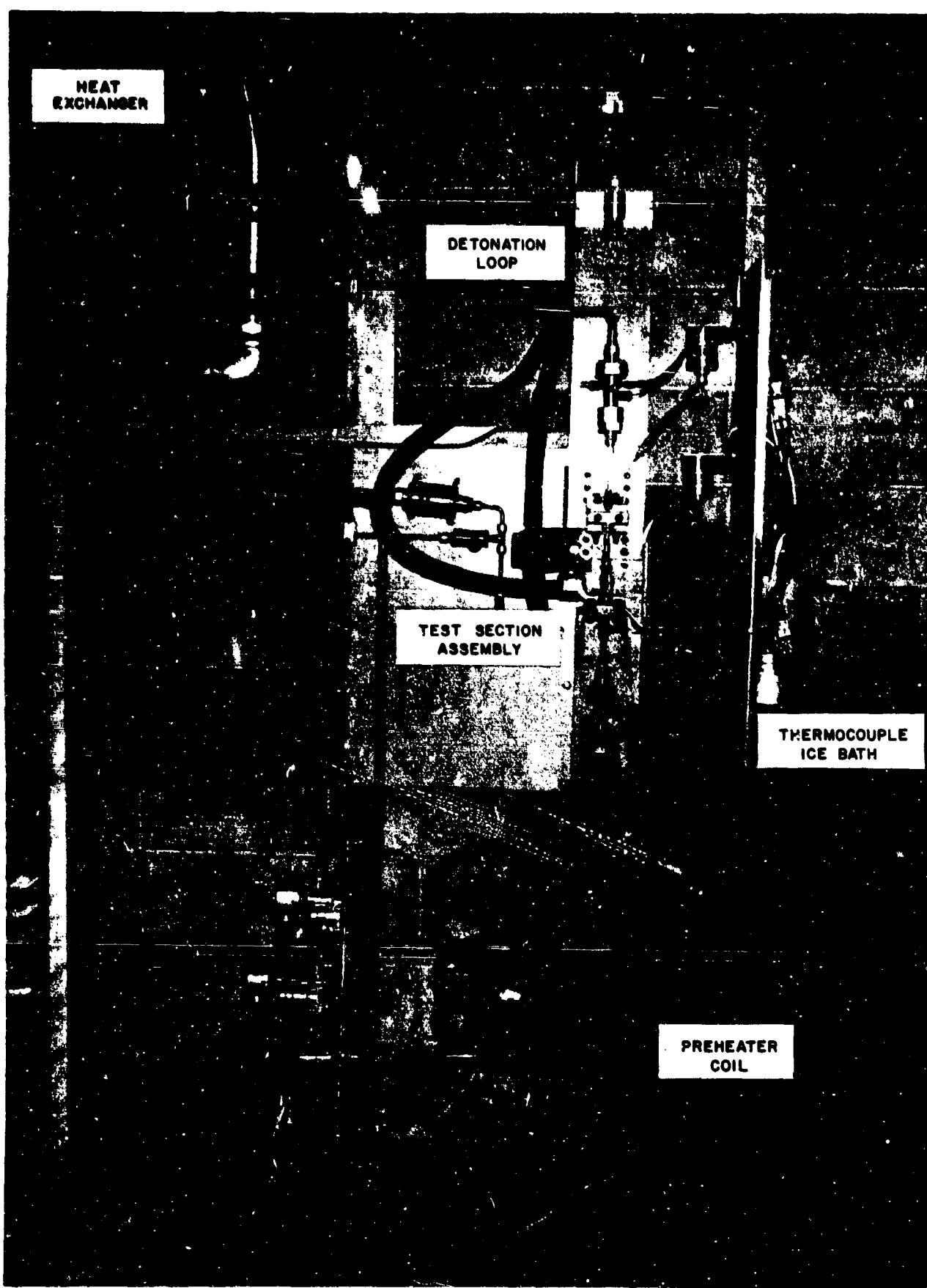


Figure 4. Preheater--Test-Section Assembly

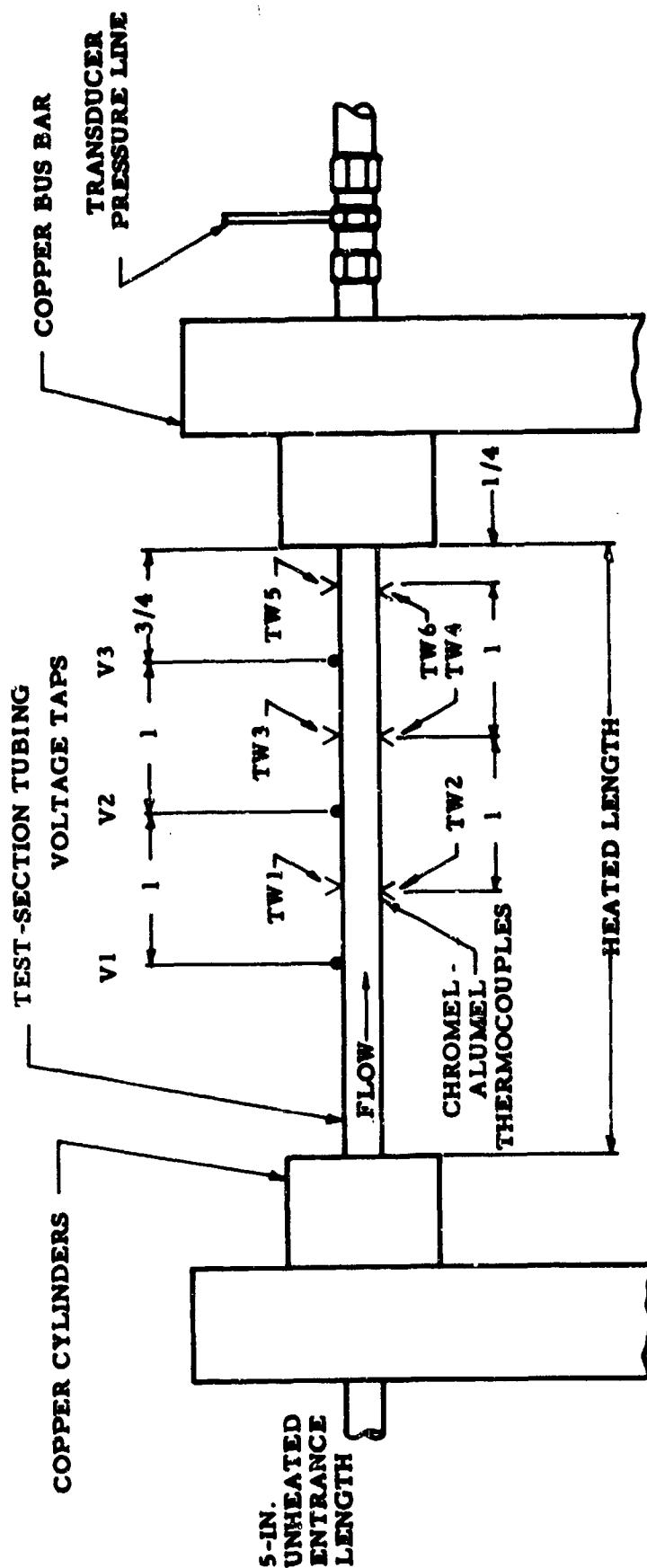


Figure 5. Test-Section Schematic

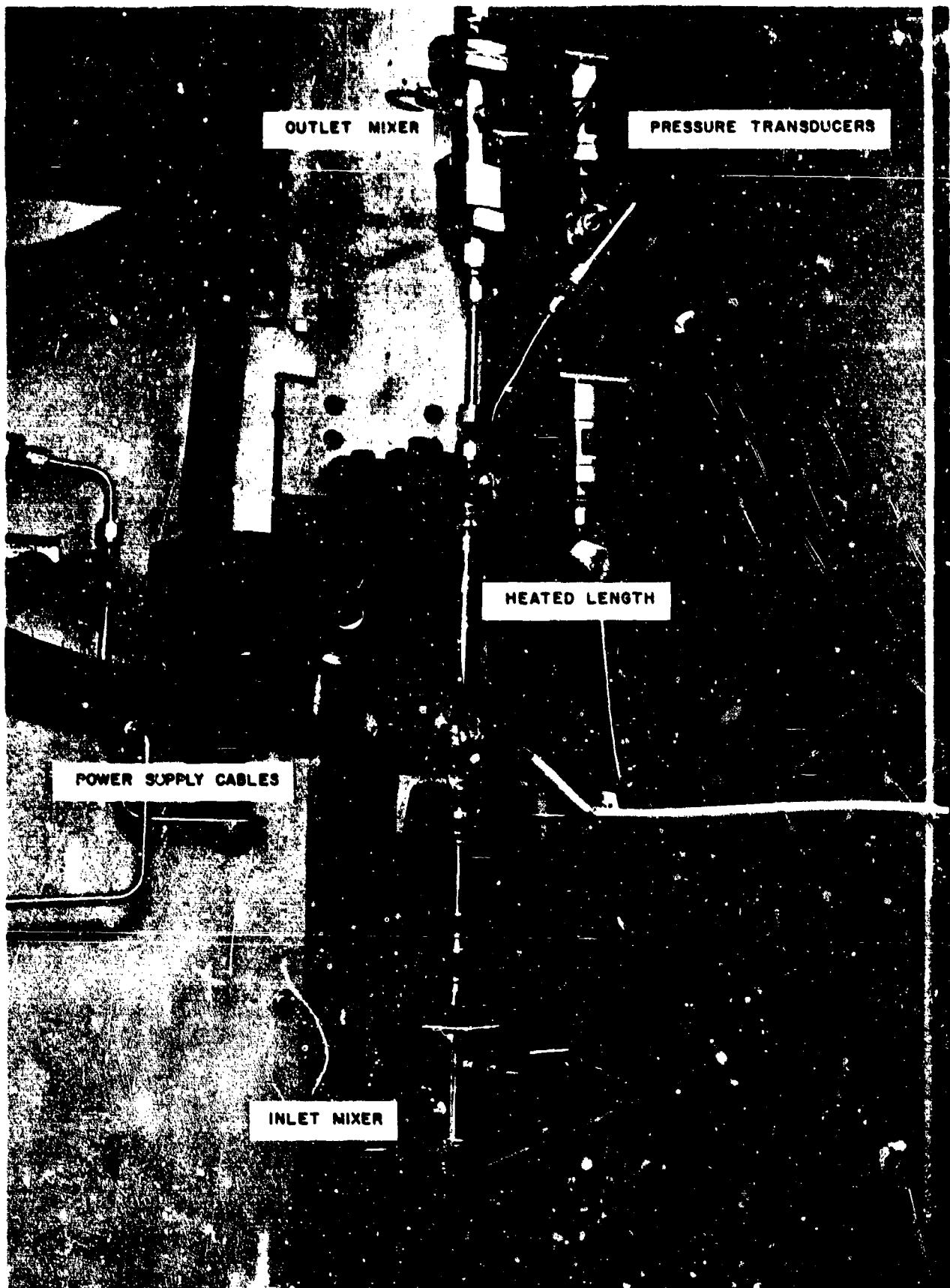


Figure 6. Mounted Test Section.

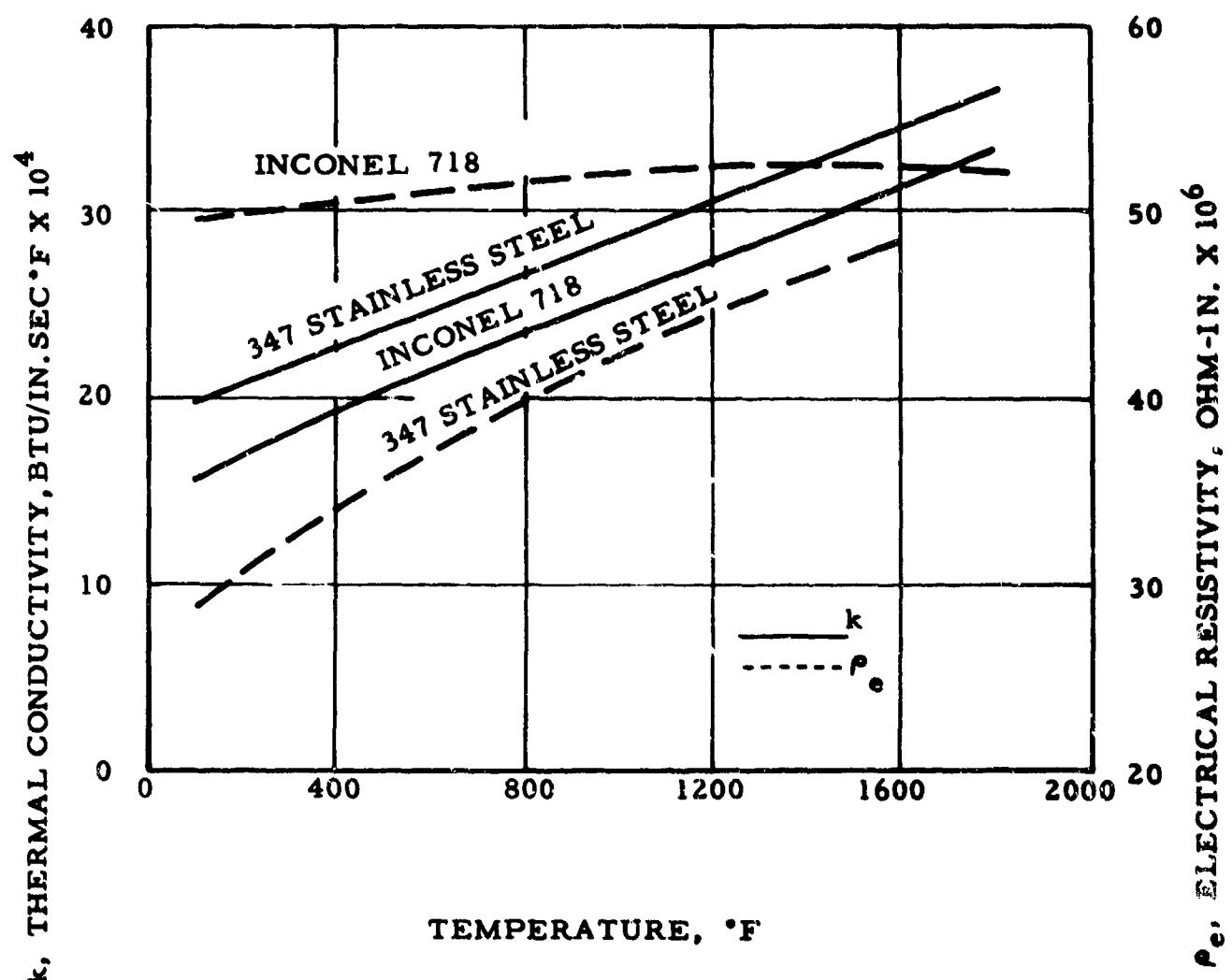


Figure 7. Thermal Conductivity and Electrical Resistivity of Inconel-718 and 347 Stainless Steel

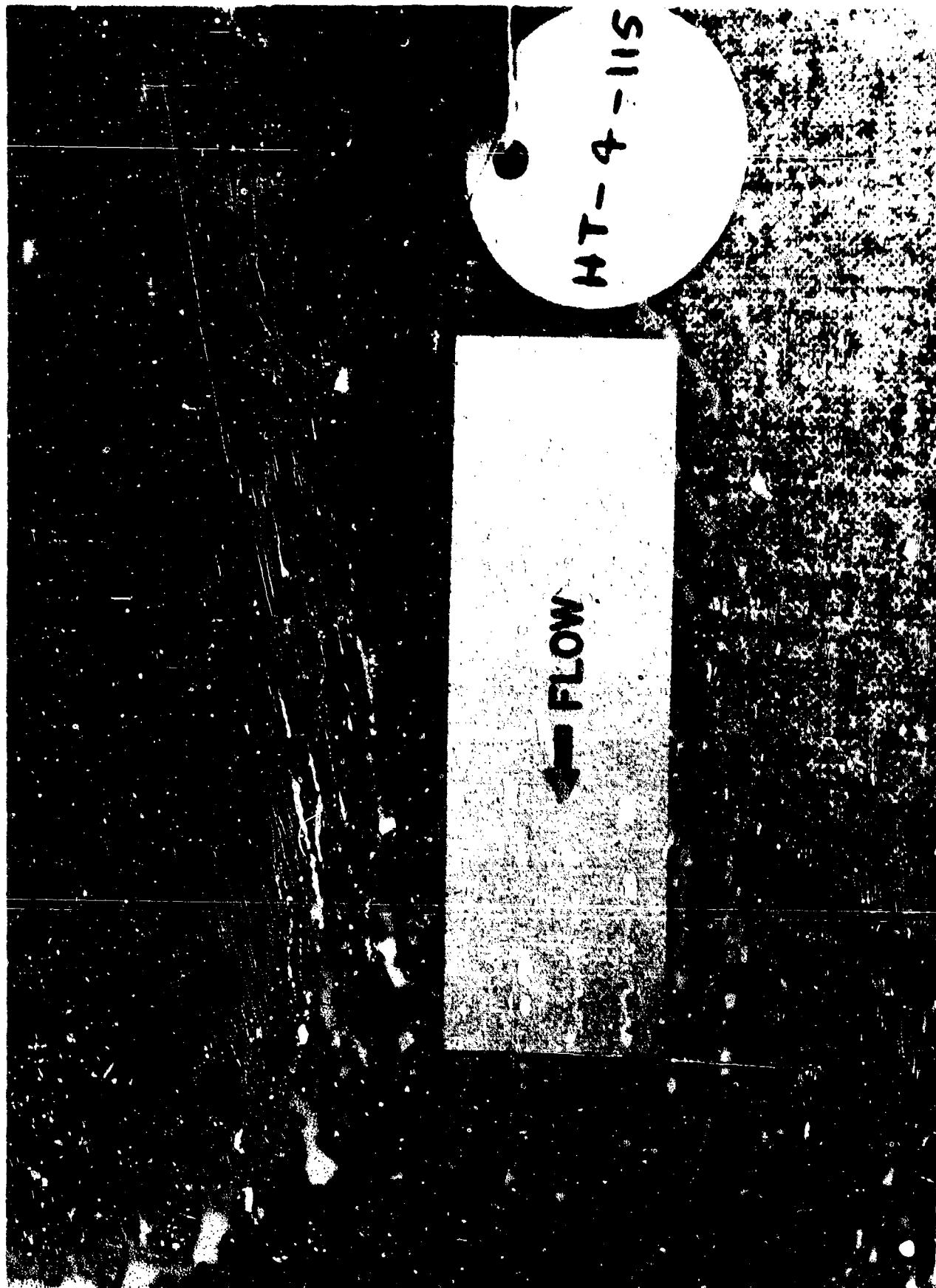


Figure 8. Complete Severance Burnout with Tube Split

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Figure 9. Complete Severance Burnout without Tube Split

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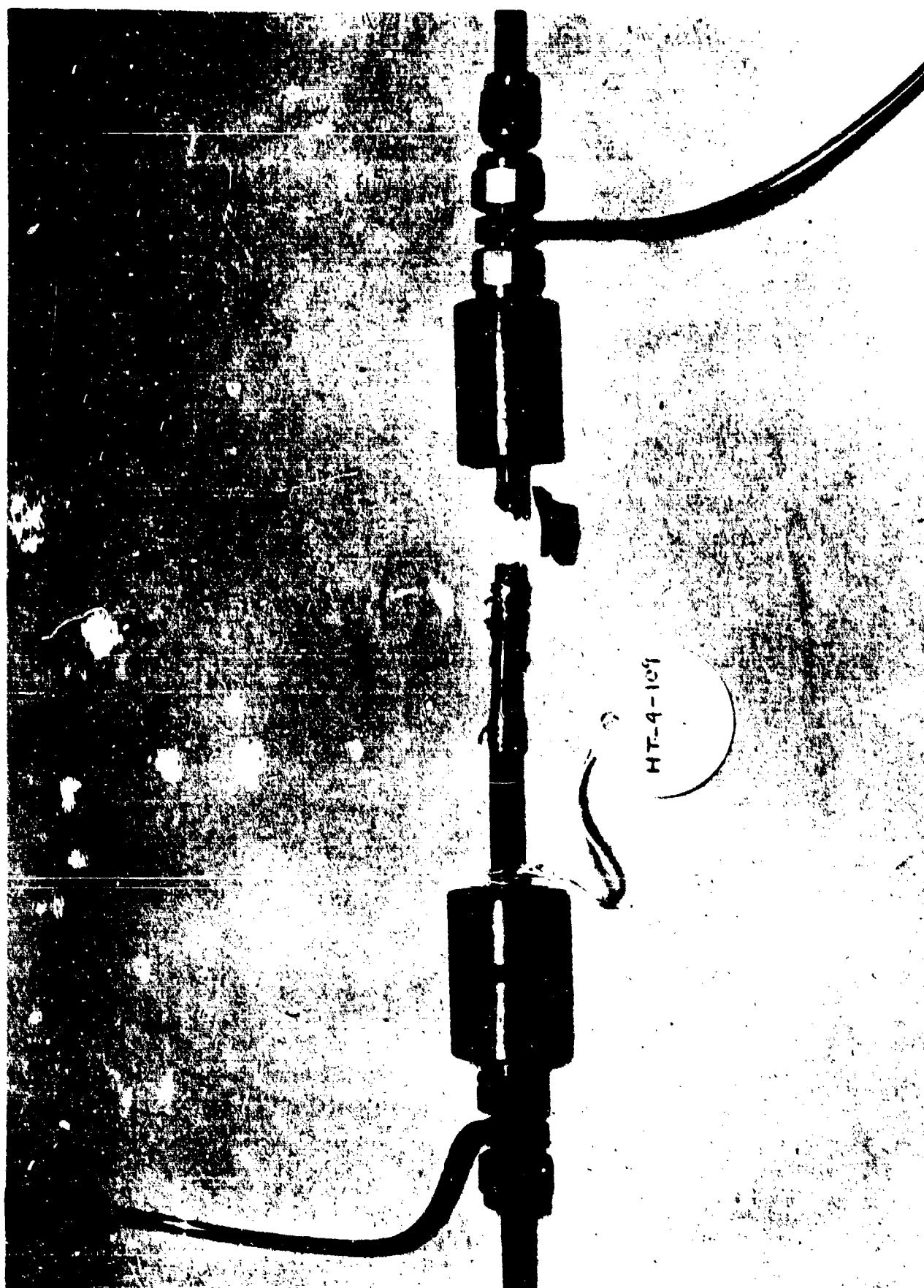


Figure 10. Burnout with Complete Severance at Two Locations

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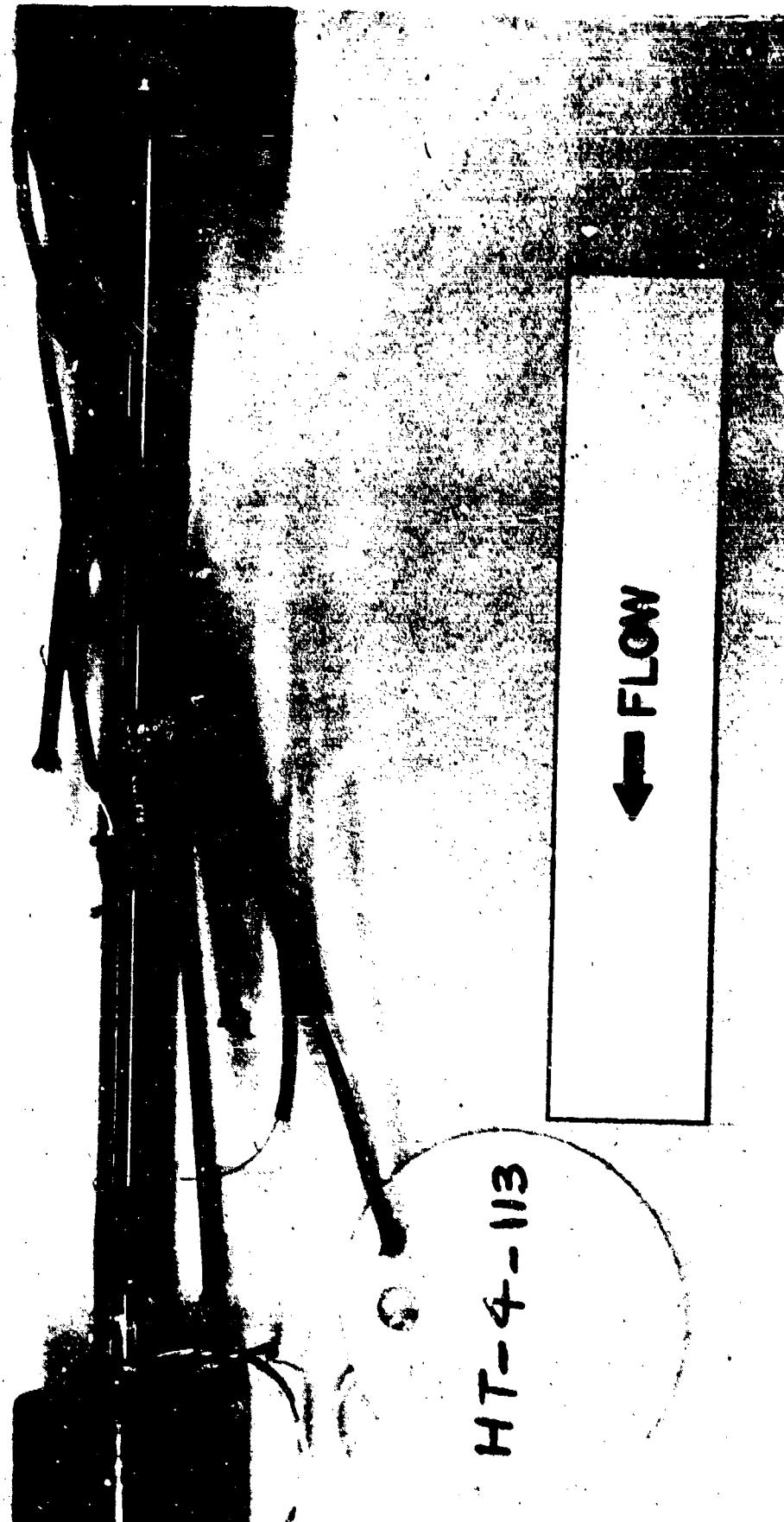


Figure 11. Tube-Split Burnout

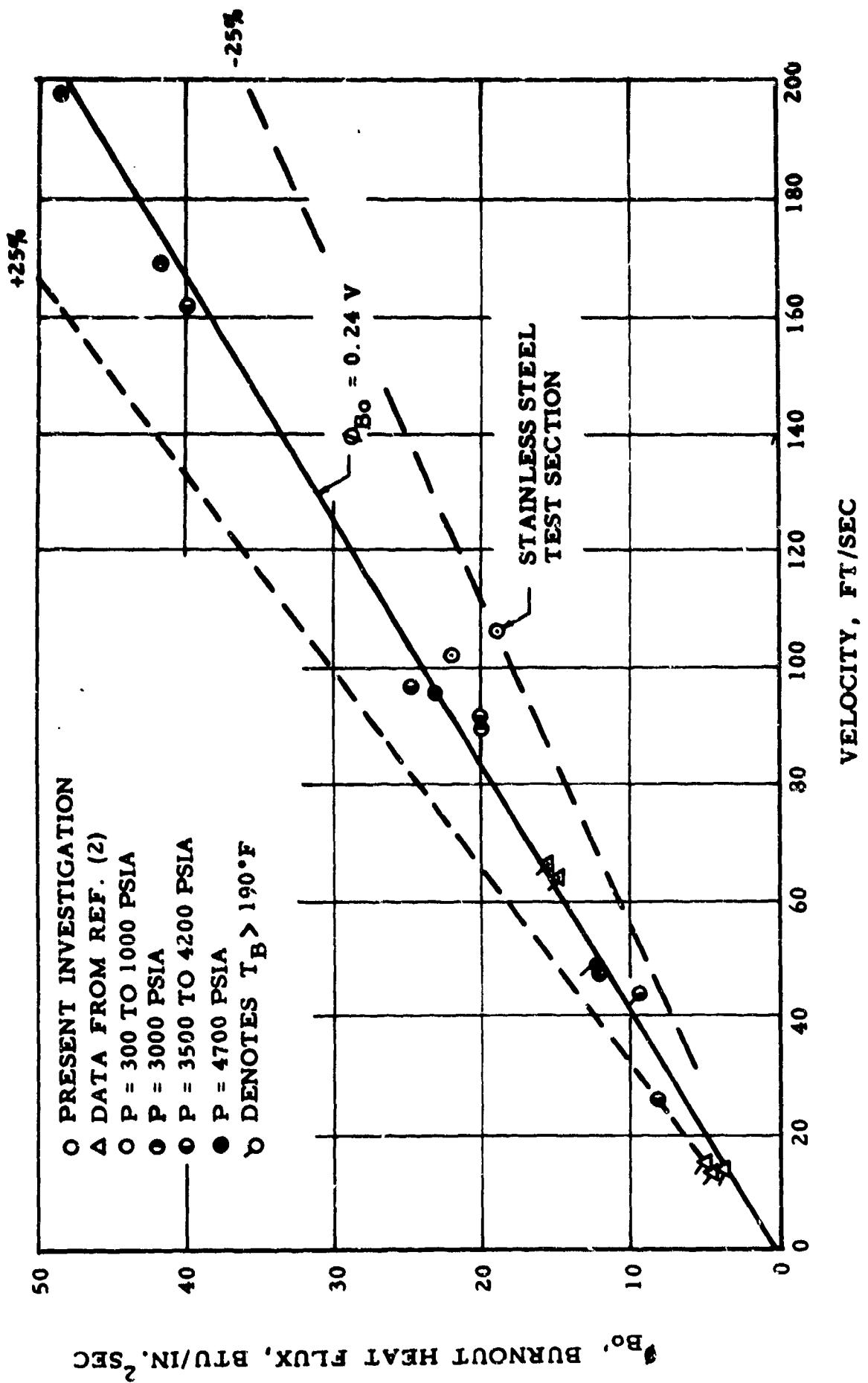


Figure 12. 90% H_2O_2 Burnout Test Results

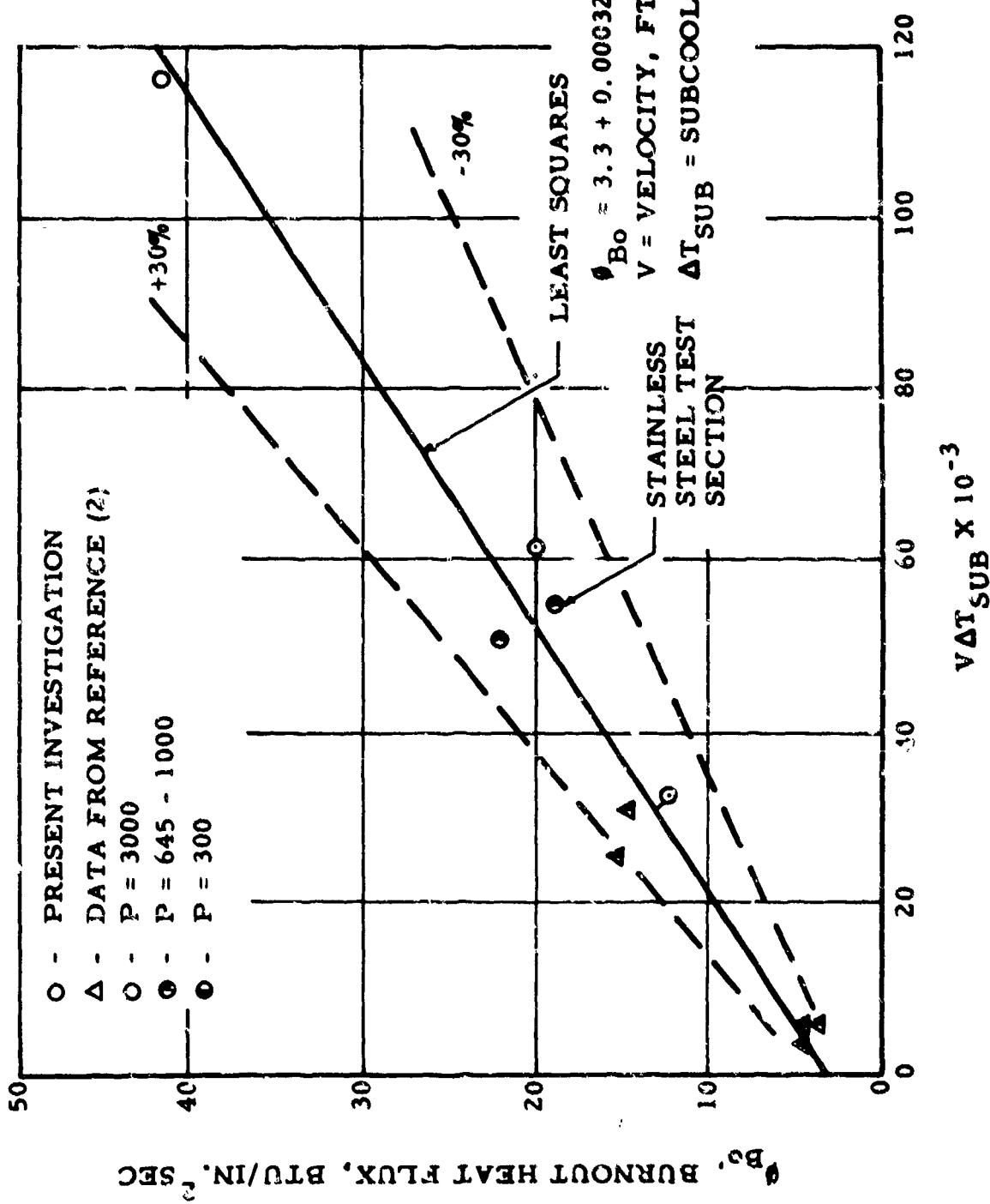
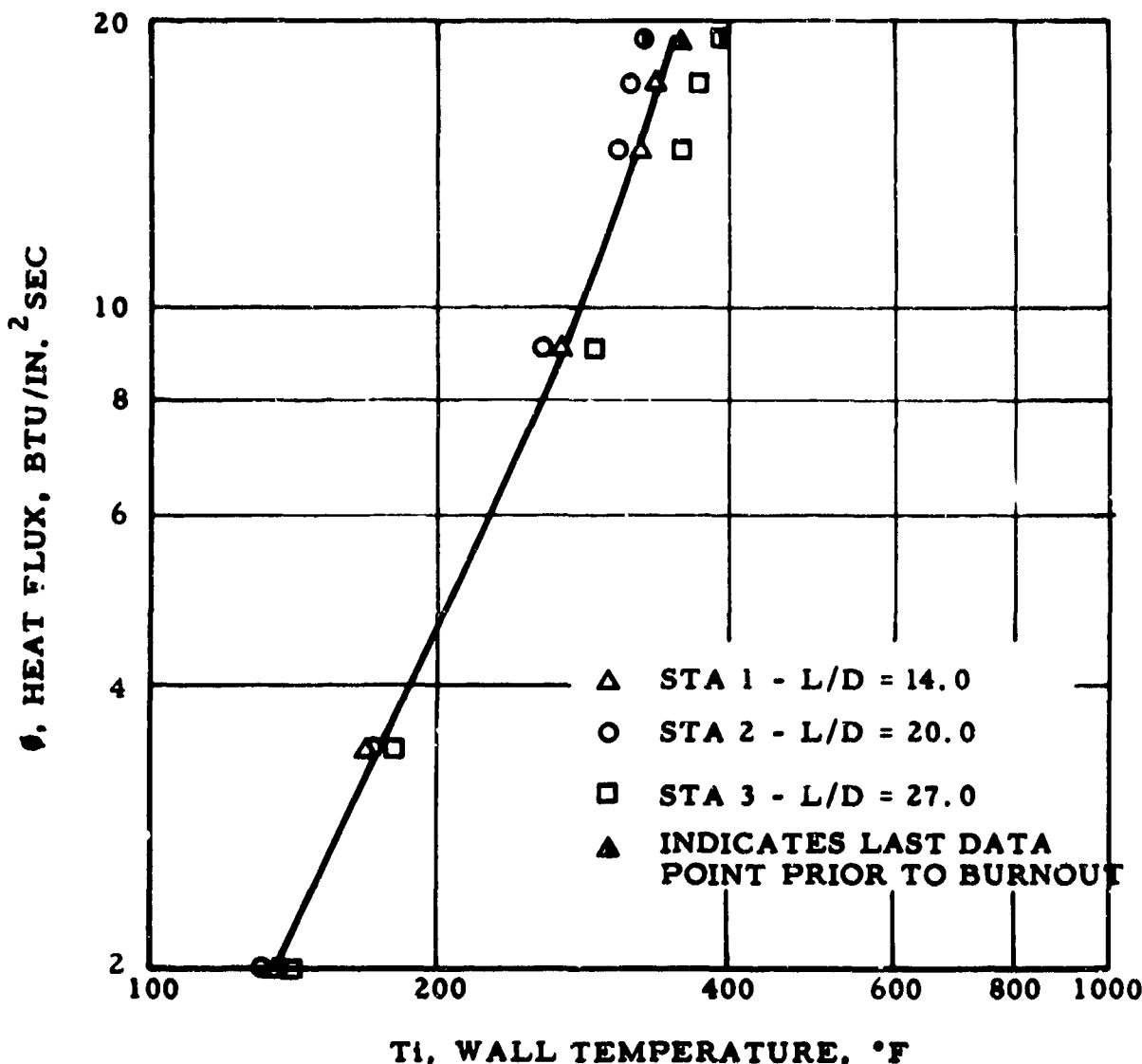


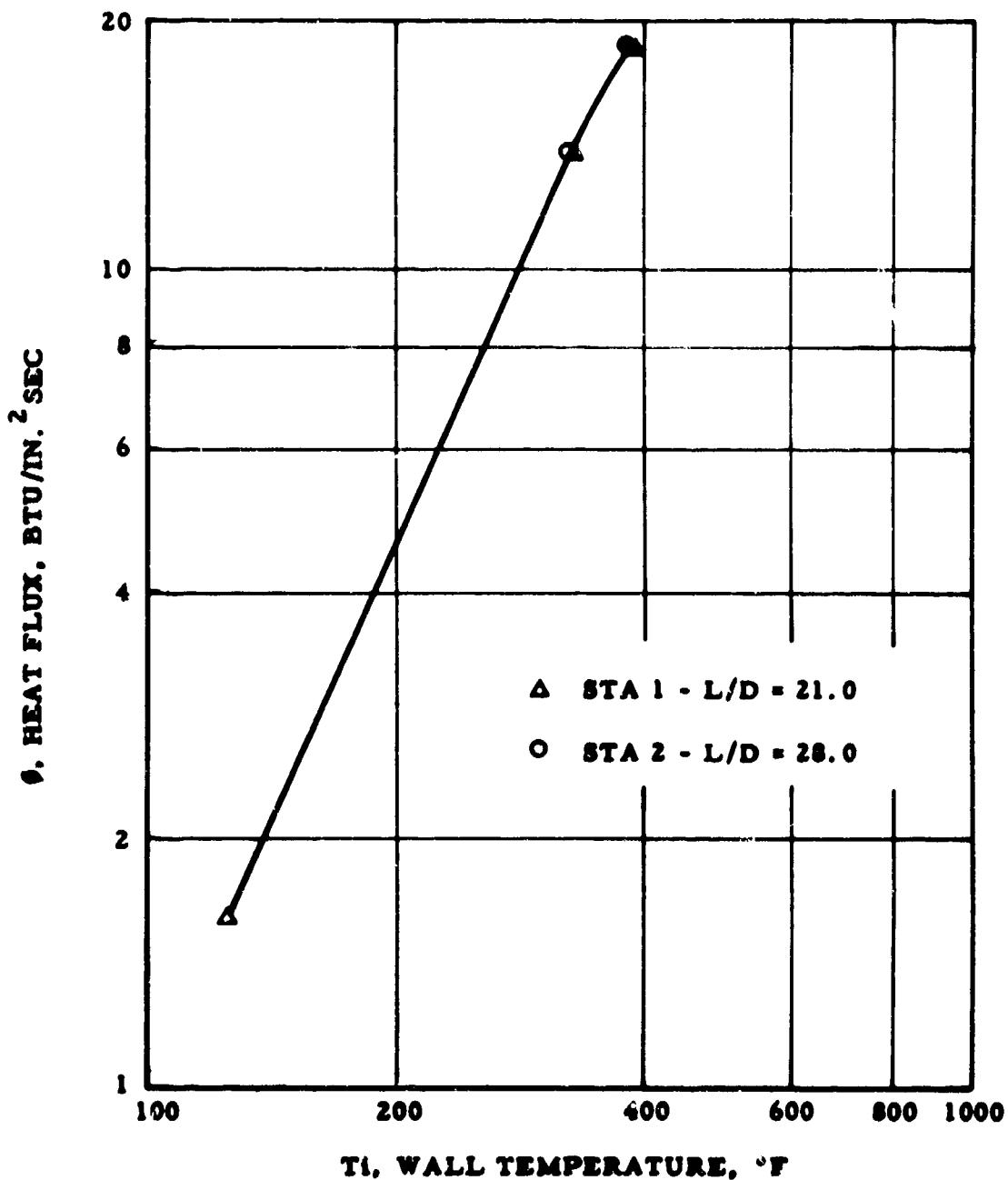
Figure 13. Subcritical 98% H_2O_2 Burnout Test Results



HT-4-134
CONDITIONS AT BURNOUT POINT:

$P = 840 \text{ PSIA}$
 $V = 101.5 \text{ FT/SEC}$
 $T_b = 156^\circ\text{F}$
 $\dot{q}_{Bo} = 22.0 \text{ BTU/IN.}^2 \text{ SEC}$

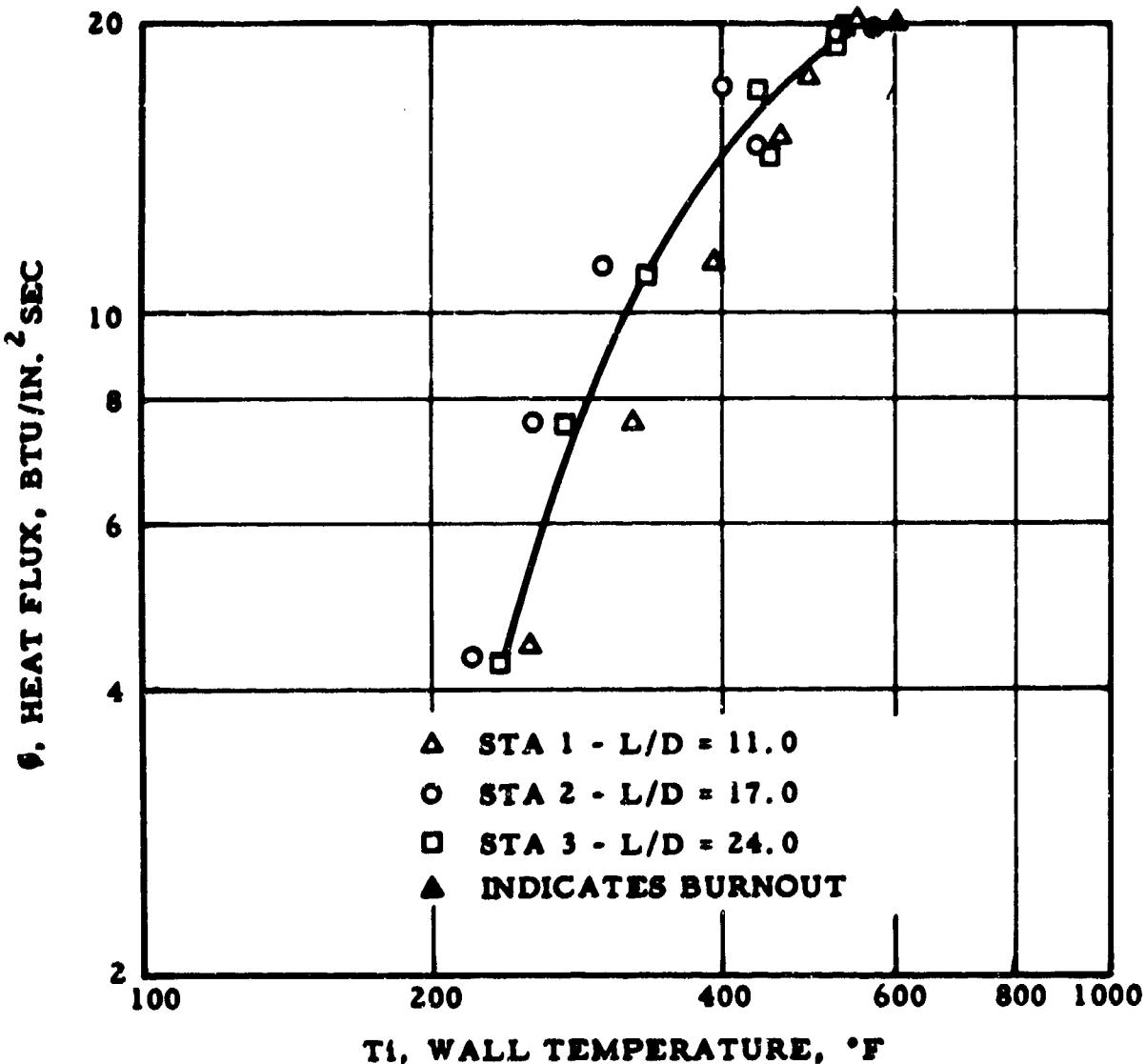
Figure 14. Subcritical 98% H_2O_2 Hea. Flux-Wall Temperature Data, Test 134



HT-4-139
CONDITIONS AT BURNOUT POINT:

$P = 860 \text{ PSIA}$
 $V = 106.0 \text{ FT/SEC}$
 $T_b = 147^\circ\text{F}$
 $\dot{q}_{bo} = 18.6 \text{ BTU/IN.}^2 \text{ SEC}$

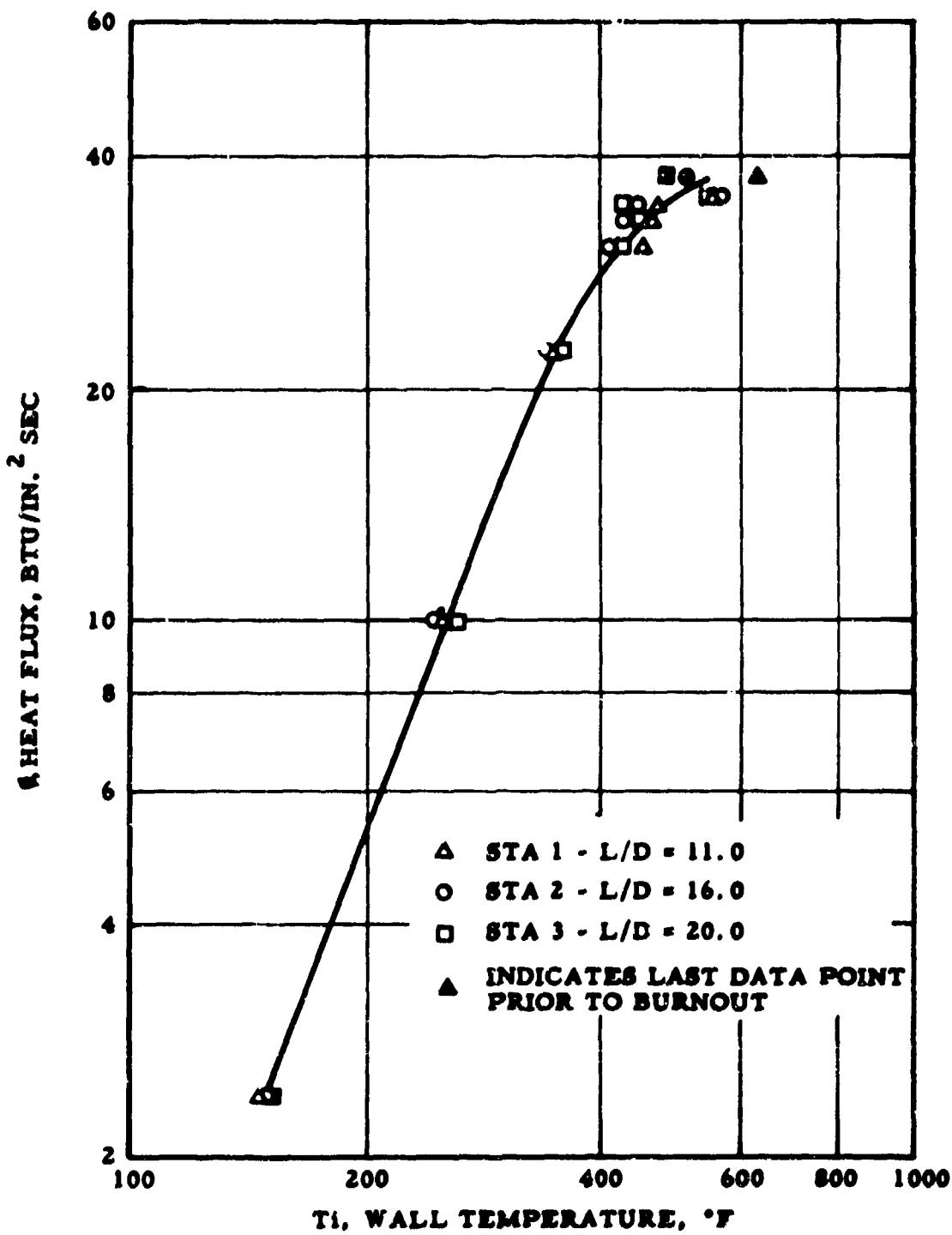
Figure 15. Subcritical 98% H_2O_2 Heat Flux-Wall Temperature Data, Test 139



CONDITIONS AT BURNOUT POINT:

P = 3020 PSIA
V = 91 FT/SEC
T_b = 176°F
Φ_{Bo} = 19.6 BTU/IN.² SEC

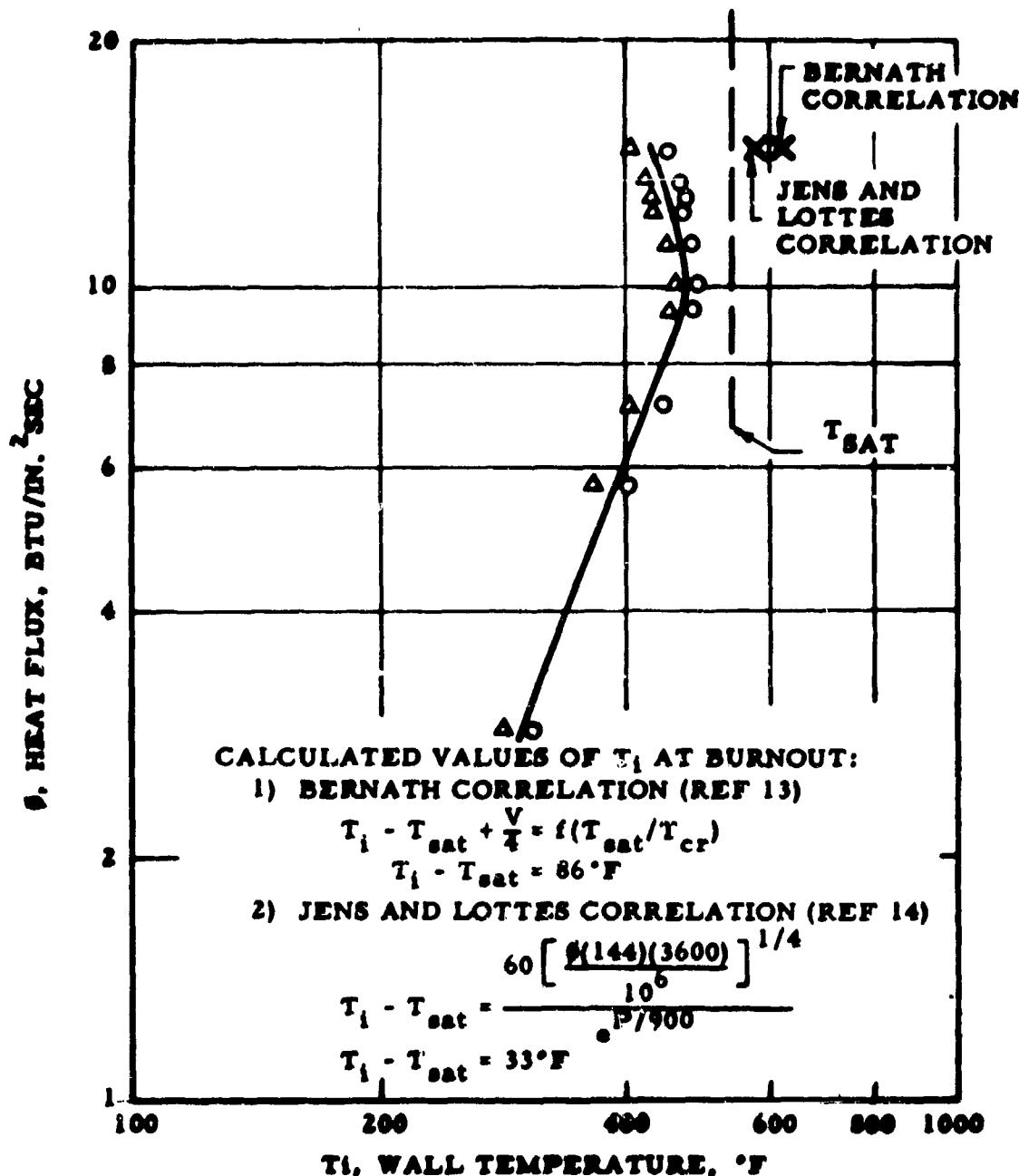
Figure 16. Subcritical 98% H₂O₂ Heat Flux-Wall Temperature Data, Test 109



HT-4-110
CONDITIONS AT BURNOUT POINT:

$P = 2910 \text{ PSIA}$
 $V = 169 \text{ FT/SEC}$
 $T_b = 154^\circ\text{F}$
 $q_{Bo} = 41.5 \text{ BTU/IN.}^2 \text{ SEC}$

Figure 17. Subcritical 90% H_2O_2 Heat Flux-Wall Temperature Data, Test 110



CONDITIONS AT BURNOUT POINT

P = 1020 PSIA

V = 38.0 FT/SEC

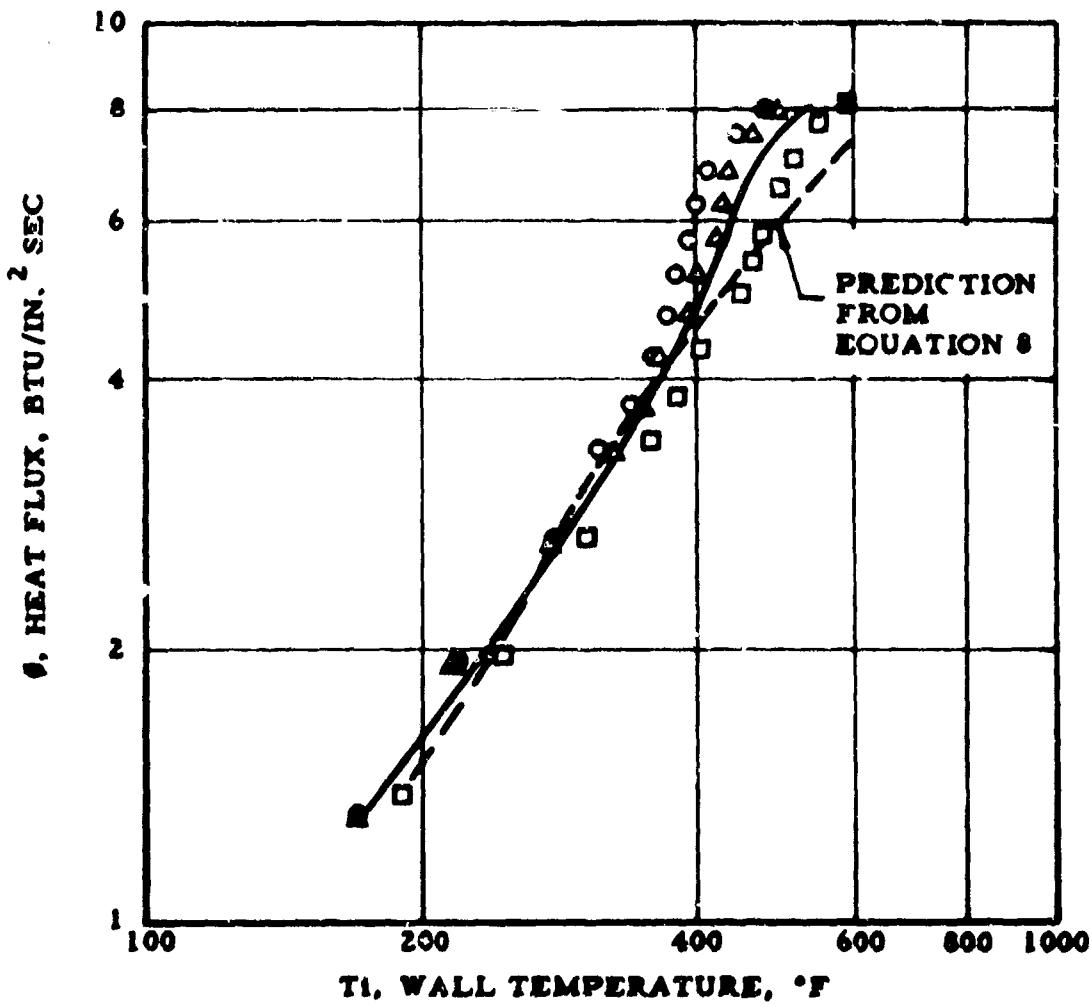
$T_b = 282^{\circ}\text{F}$

$\theta_{Be} = 14.6 \text{ BTU/IN.}^2 \text{ SEC}$

▲ - L/D = 16 (STA 1)

○ - L/D = 10 (STA 2)

Figure 18. Deionized Water Heat Flux-Wall Temperature Data, Test 106

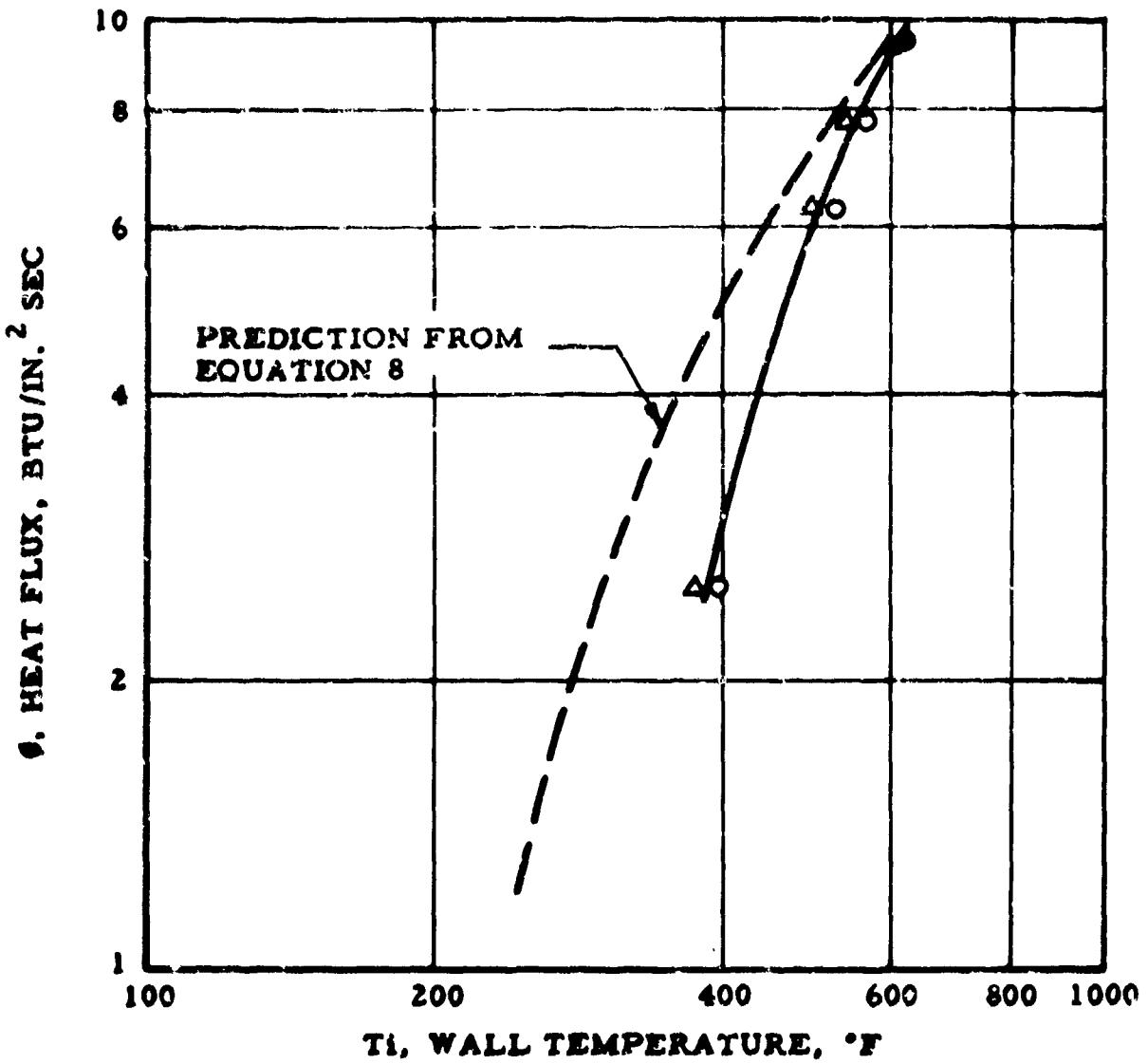


△ STA 1 - $L/D = 13.0$
○ STA 2 - $L/D = 17.0$
□ STA 3 - $L/D = 22.0$
▲ INDICATES BURNOUT

HT-4-113
CONDITIONS AT BURNOUT POINT:

$P = 4020 \text{ PSIA}$
 $V = 25.3 \text{ FT/SEC}$
 $T_b = 137^\circ F$
 $\theta_{Bo} = 8.1 \text{ BTU/IN.}^2 \text{ SEC}$

Figure 19. Supercritical 98% H_2O Heat Flux-Wall Temperature Data, Test 113

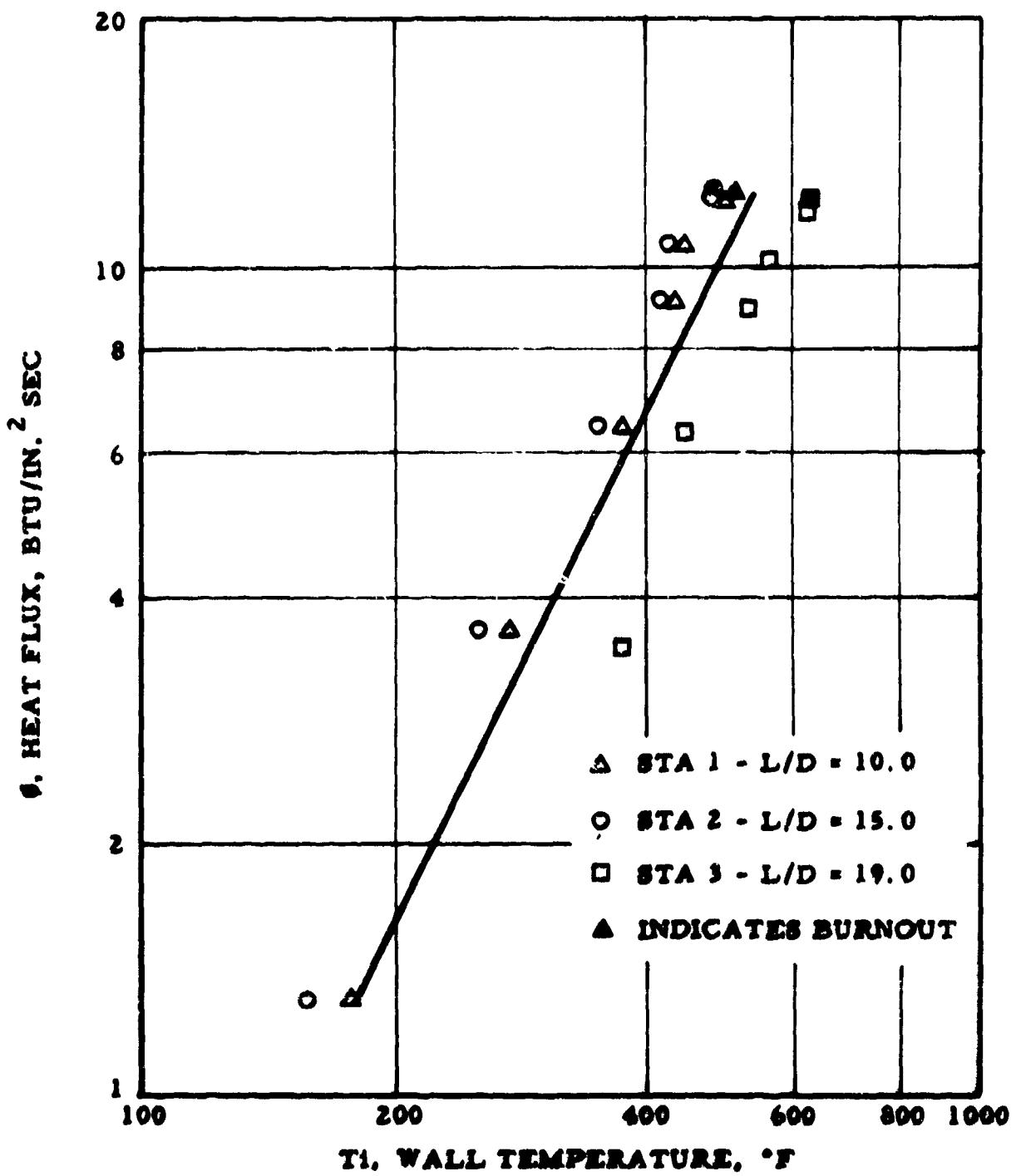


- △ STA 1 - $L/D = 13.0$
- STA 2 - $L/D = 17.0$
- ▲ INDICATES BURNOUT

HT-4-124
CONDITIONS AT BURNOUT POINT:

$$\begin{aligned} P &= 4150 \text{ PSIA} \\ V &= 44.6 \\ T_b &= 235^\circ\text{F} \\ q_{bo} &= 9.4 \text{ BTU/IN.}^2 \text{ SEC} \end{aligned}$$

Figure 20. Supercritical 90% H_2O_2 Heat Flux-Wall Temperature Data, Test 124



HT-4-112
CONDITIONS AT BURNOUT POINT:

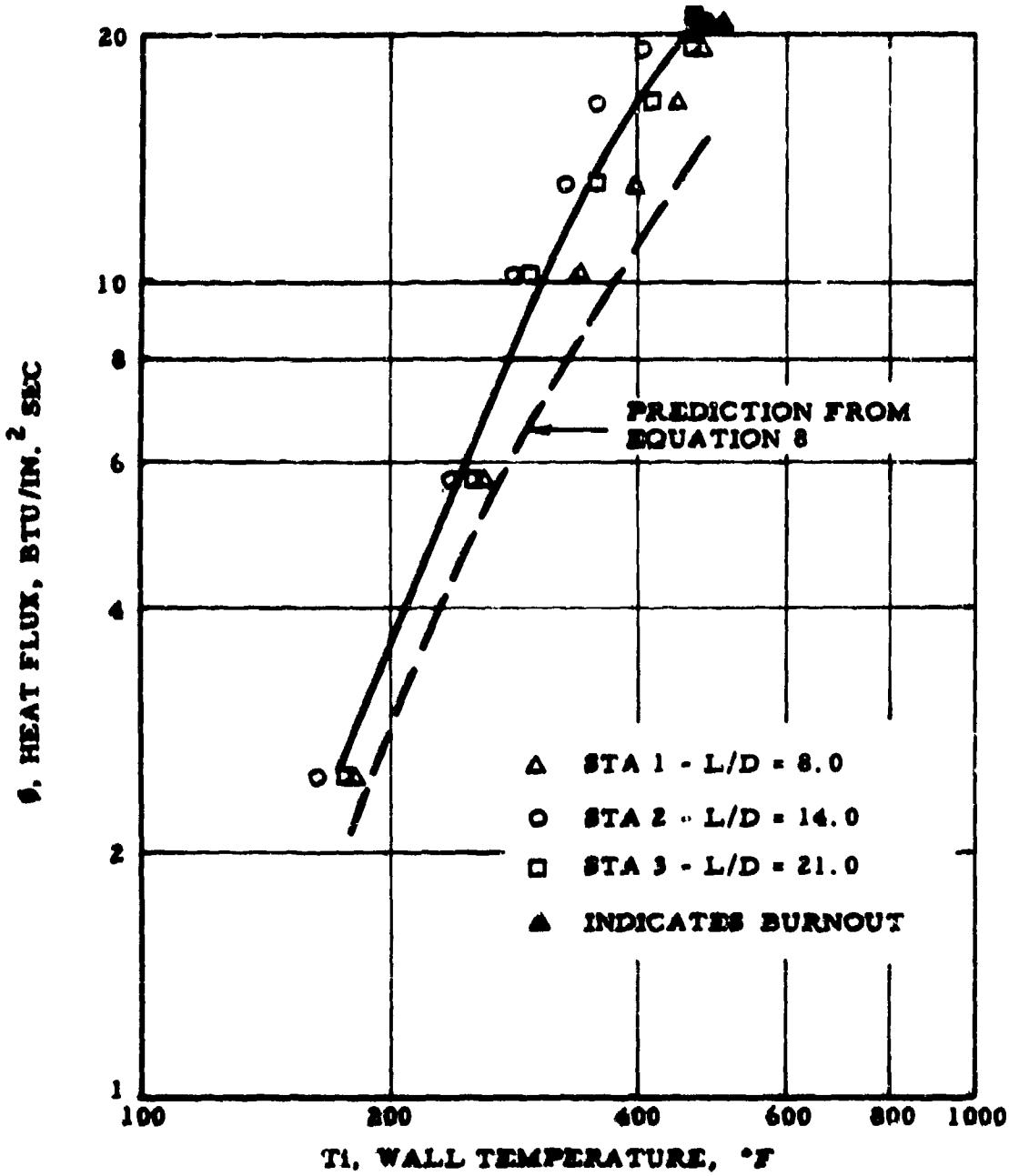
P = 3950 PSIA

V = 47.9 FT/SEC

T_b = 170°F

Φ_{Bo} = 12.0 BTU/IN.² SEC

Figure 21. Supercritical 90% H₂O₂ Heat Flux-Wall Temperature Data, Test 112



MT-4-116

CONDITIONS AT BURNOUT POINT:

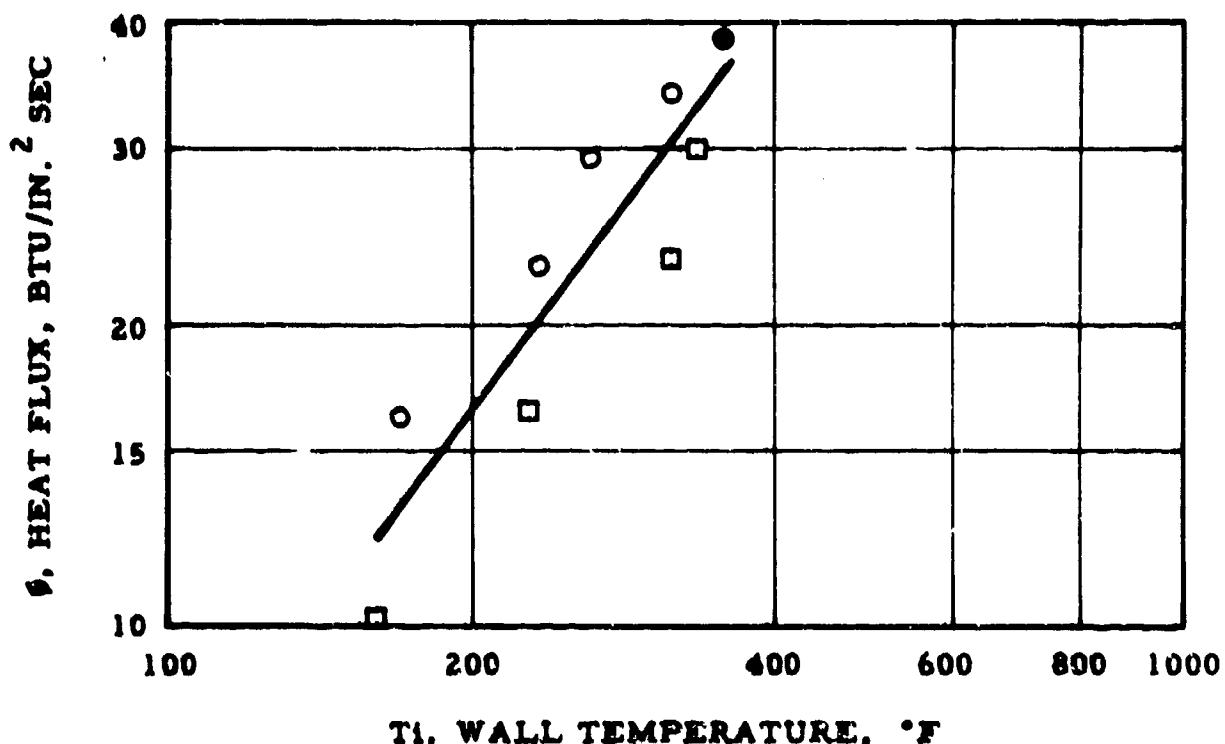
$$P = 3930 \text{ PSIA}$$

$$V = 91.5 \text{ FT/SEC}$$

$$T_b = 156^\circ\text{F}$$

$$q_{bo} = 20.7 \text{ BTU/IN.}^2 \text{ SEC}$$

Figure 22. Supercritical 98% H_2O_2 Heat Flux-Wall Temperature Data, Test 116

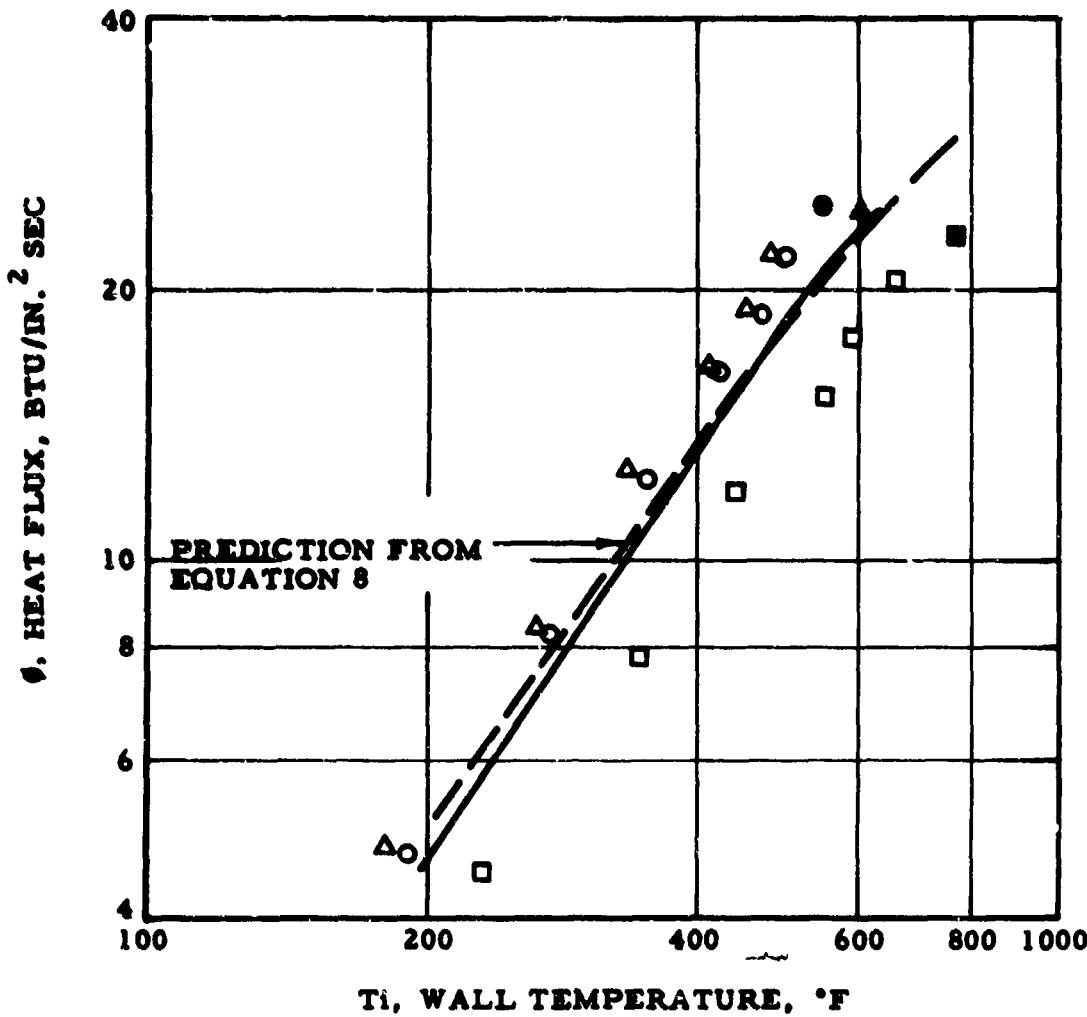


○ STA 2 - L/D = 21.0
□ STA 3 - L/D = 27.0
● INDICATES BURNOUT

HT-4-114
CONDITIONS AT BURNOUT POINT:

P = 3750 PSIA
V = 161.5 FT/SEC
T_b = 144°F
q_{Bo} = 39.6 BTU/IN.² SEC

Figure 23. Supercritical 98% H₂O₂ Heat Flux-Wall Temperature Data, Test 114



HT-4-115
CONDITIONS AT BURNOUT POINT:
P = 4700 PSIA
V = 95.5 FT/SEC
T_b = 153°F
θ_{Bo} = 23.0 BTU/IN.² SEC

Figure 24. Supercritical 98% H₂O₂ Heat Flux-Wall Temperature Data, Test 115

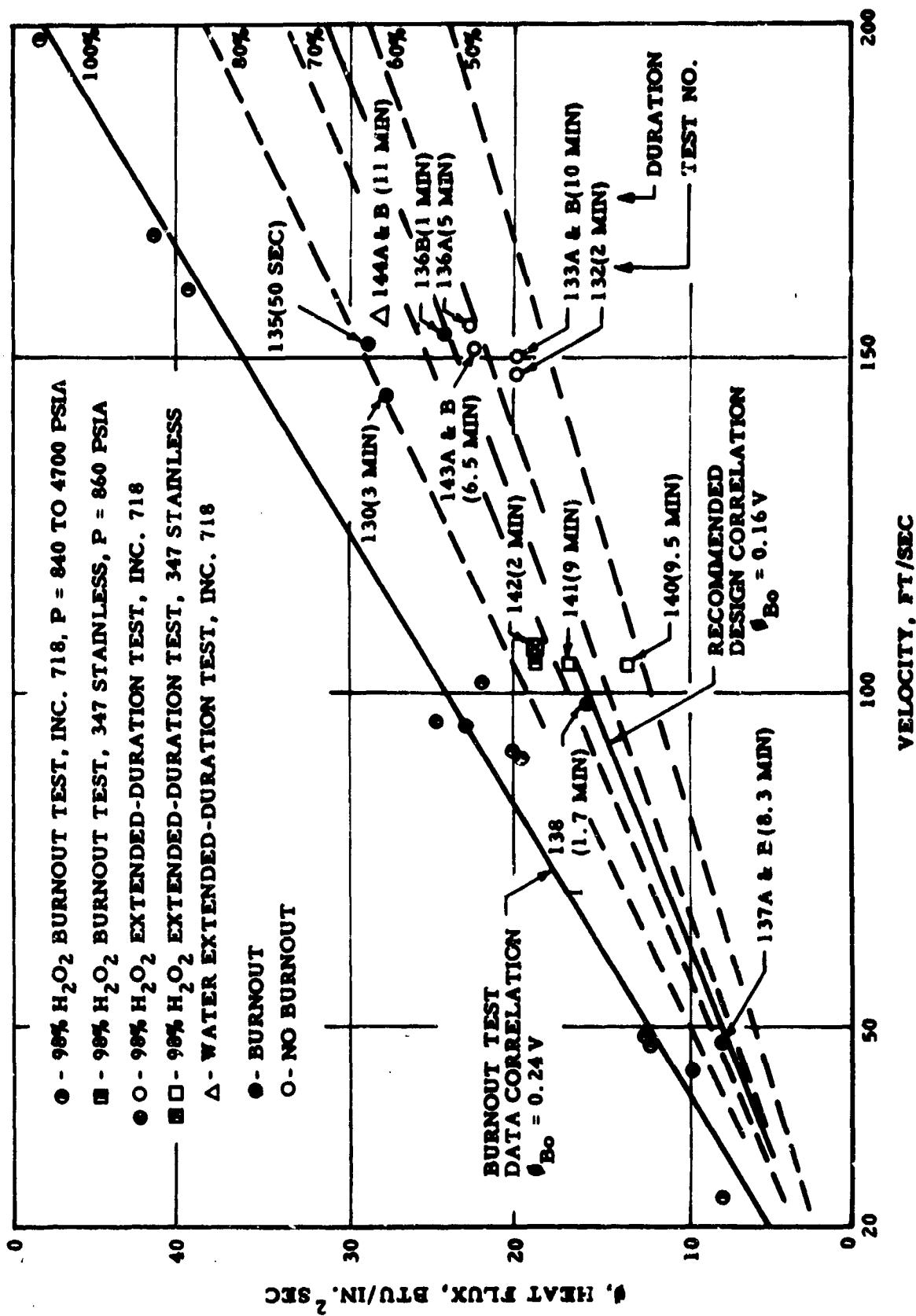


Figure 25. Extended-Duration Test Results

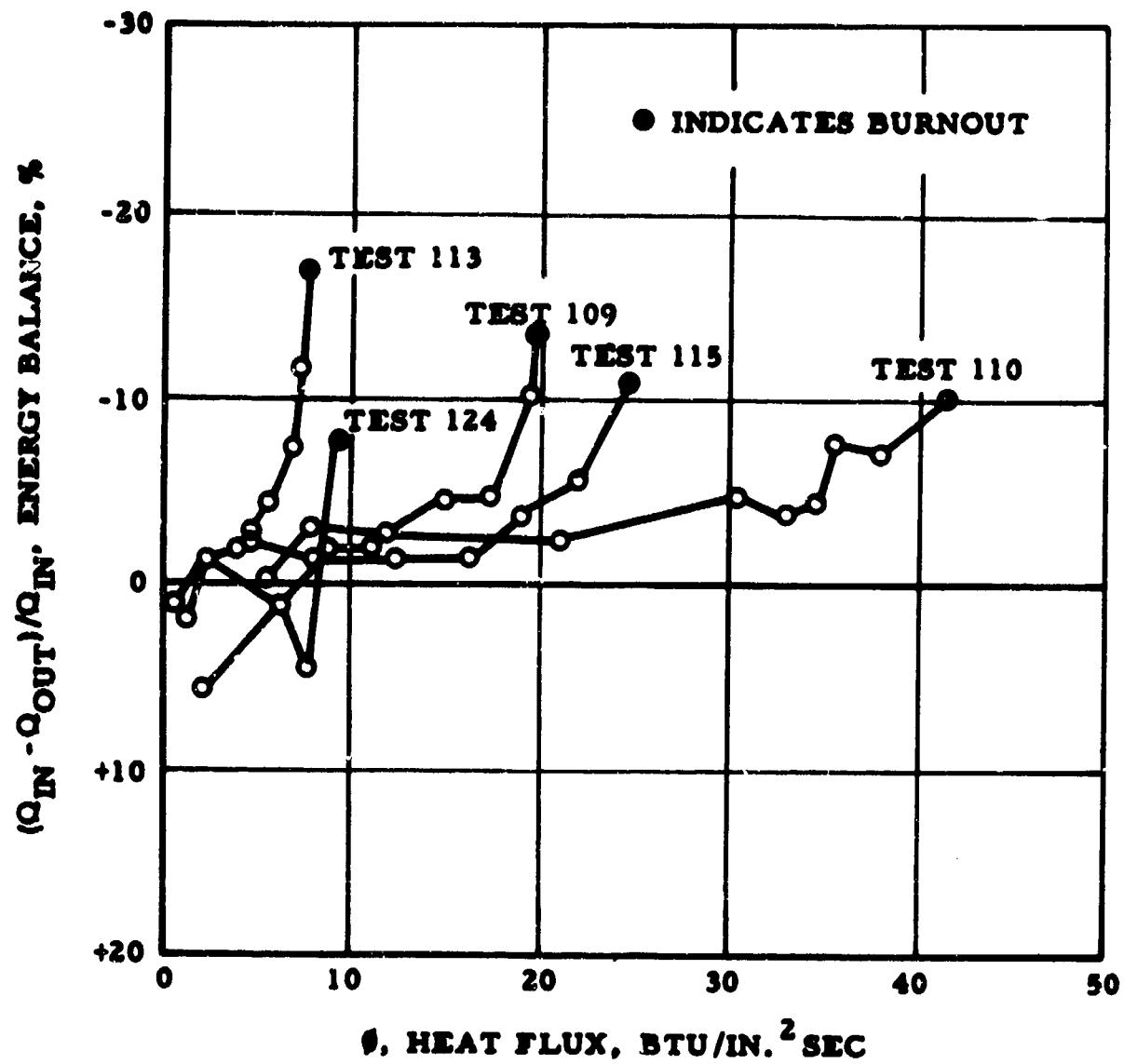


Figure 26. Burnout Test-Energy Balances

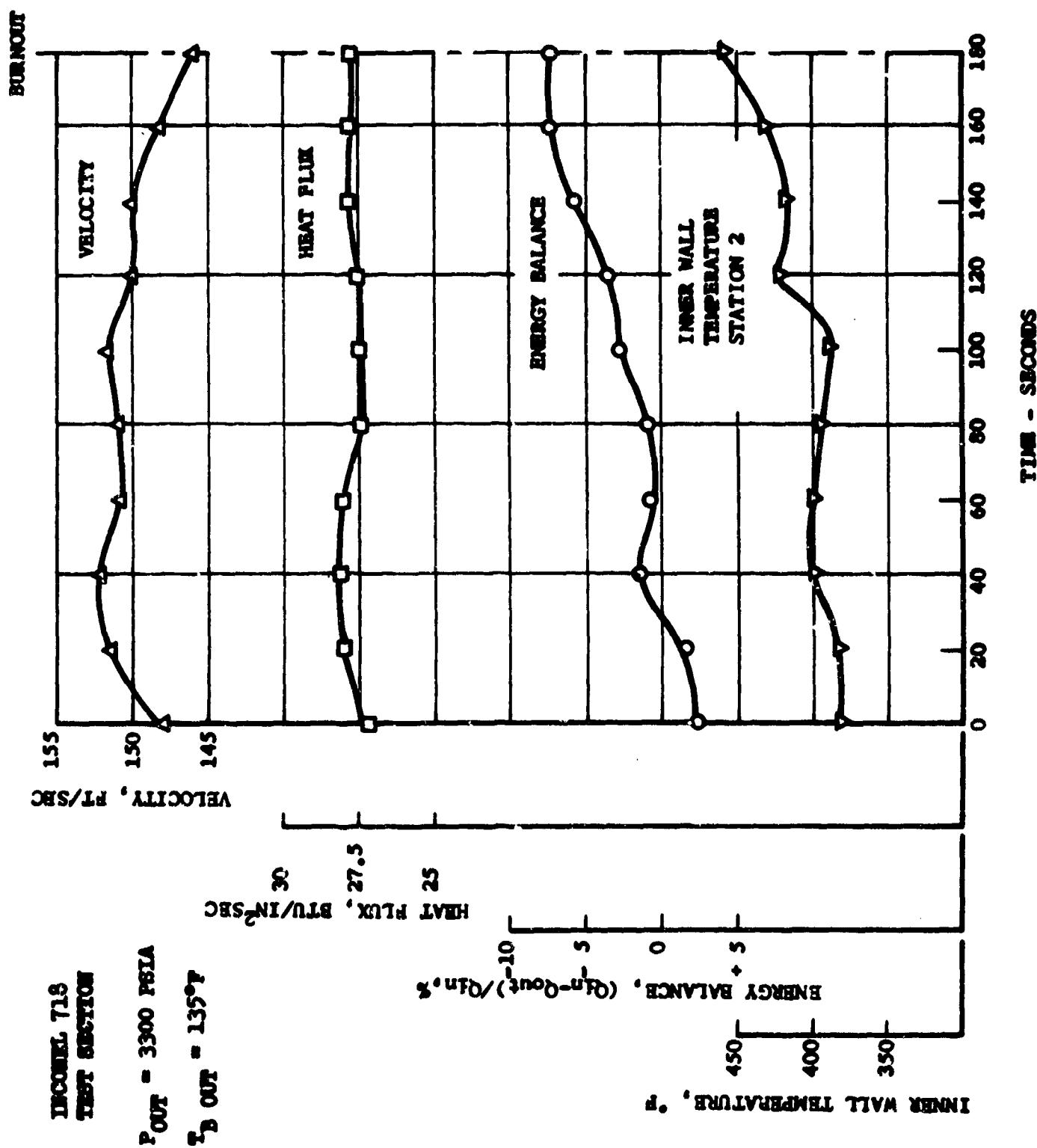


Figure 27. 90% H₂O₂ Extended-Duration Test Parameters, Test 130

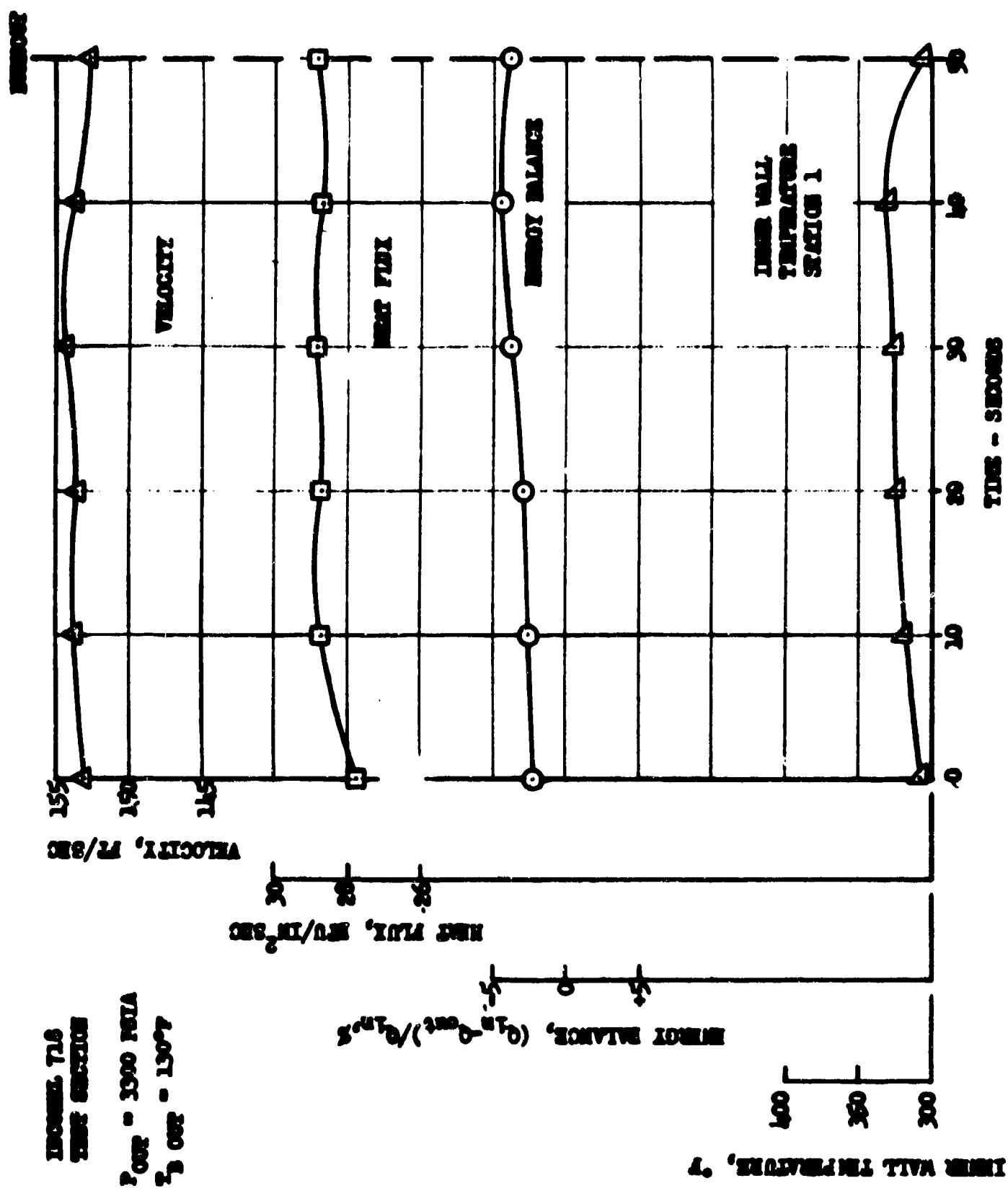


Figure 28. 98% H_2O_2 Extended-Duration Test Parameters, Test 135

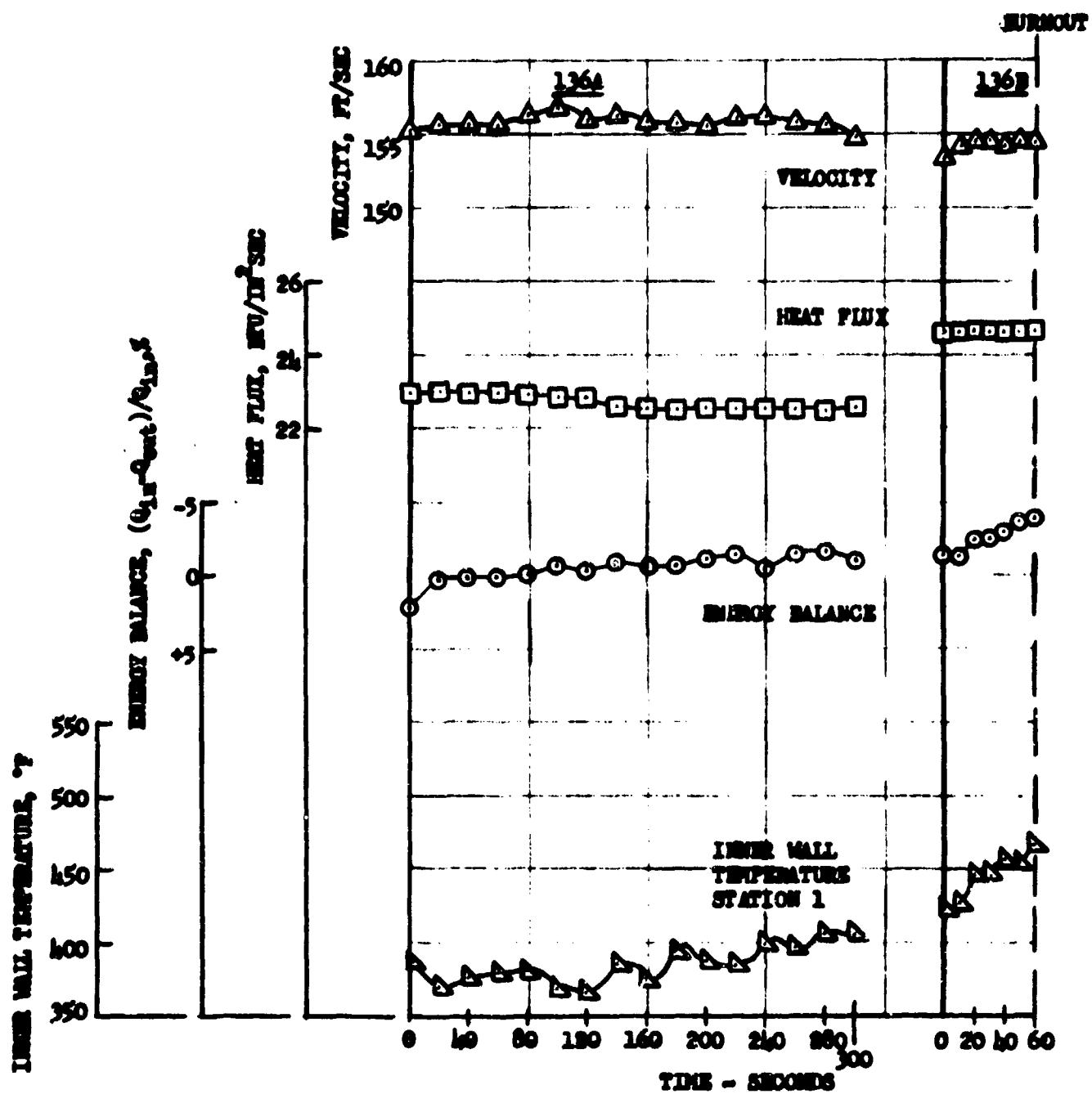


Figure 29. 98% H₂O₂ Extended-Duration Test Parameters, Test 136

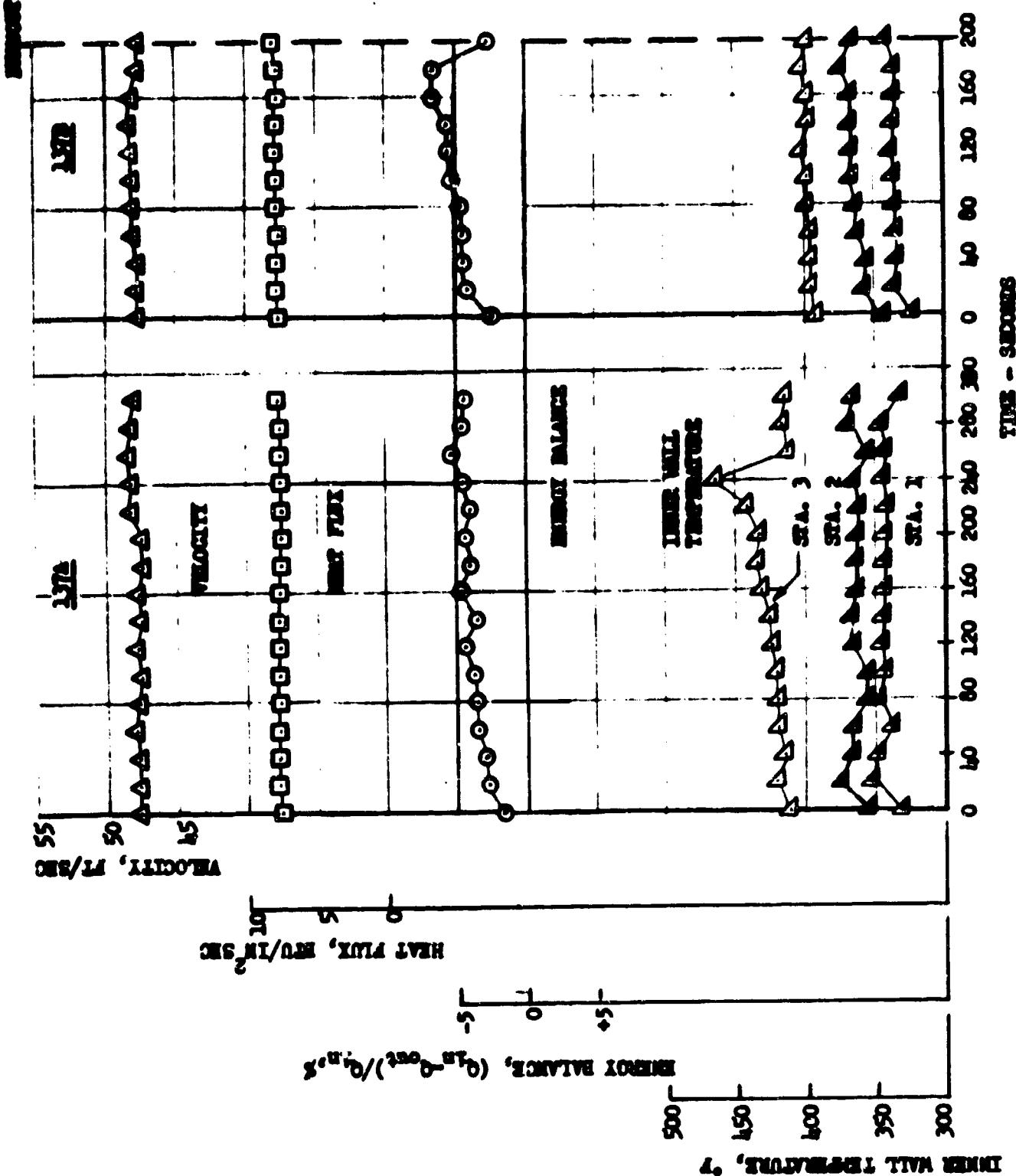


Figure 30. 98% H₂O₂ Extended-Duration Test Parameters, Test 137

INCONEL 718
TEST SECTION
 $P_{OUT} = 3500 \text{ PSIA}$
 $T_{B OUT} = 155^\circ\text{F}$

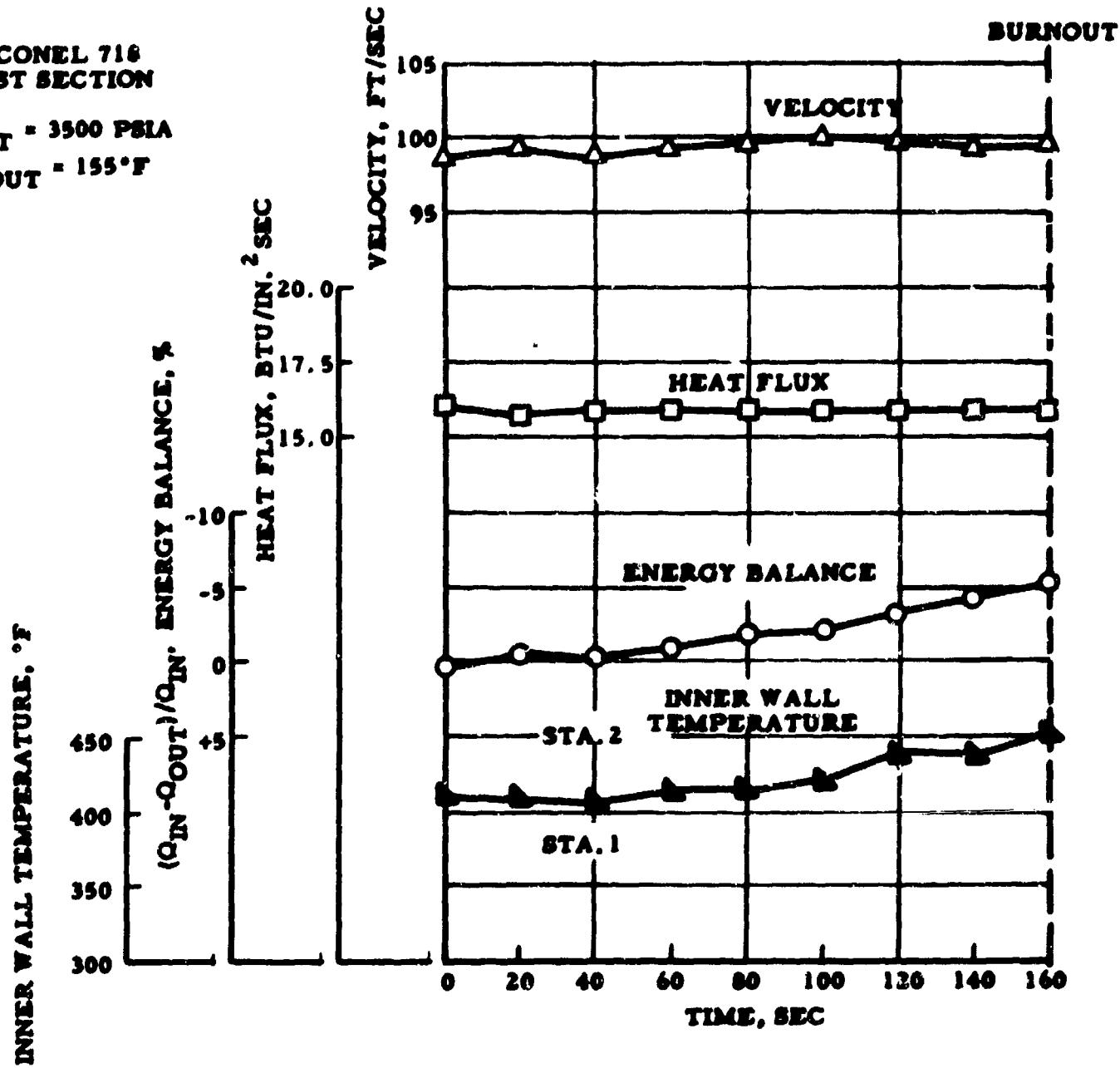


Figure 31. 98% H_2O_2 Extended-Duration Test Parameters, Test 138

347 STAINLESS STEEL
TEST SECTION

$P_{CO_2} = 660 \text{ PSIA}$

$T_{CO_2} = 140^\circ\text{F}$

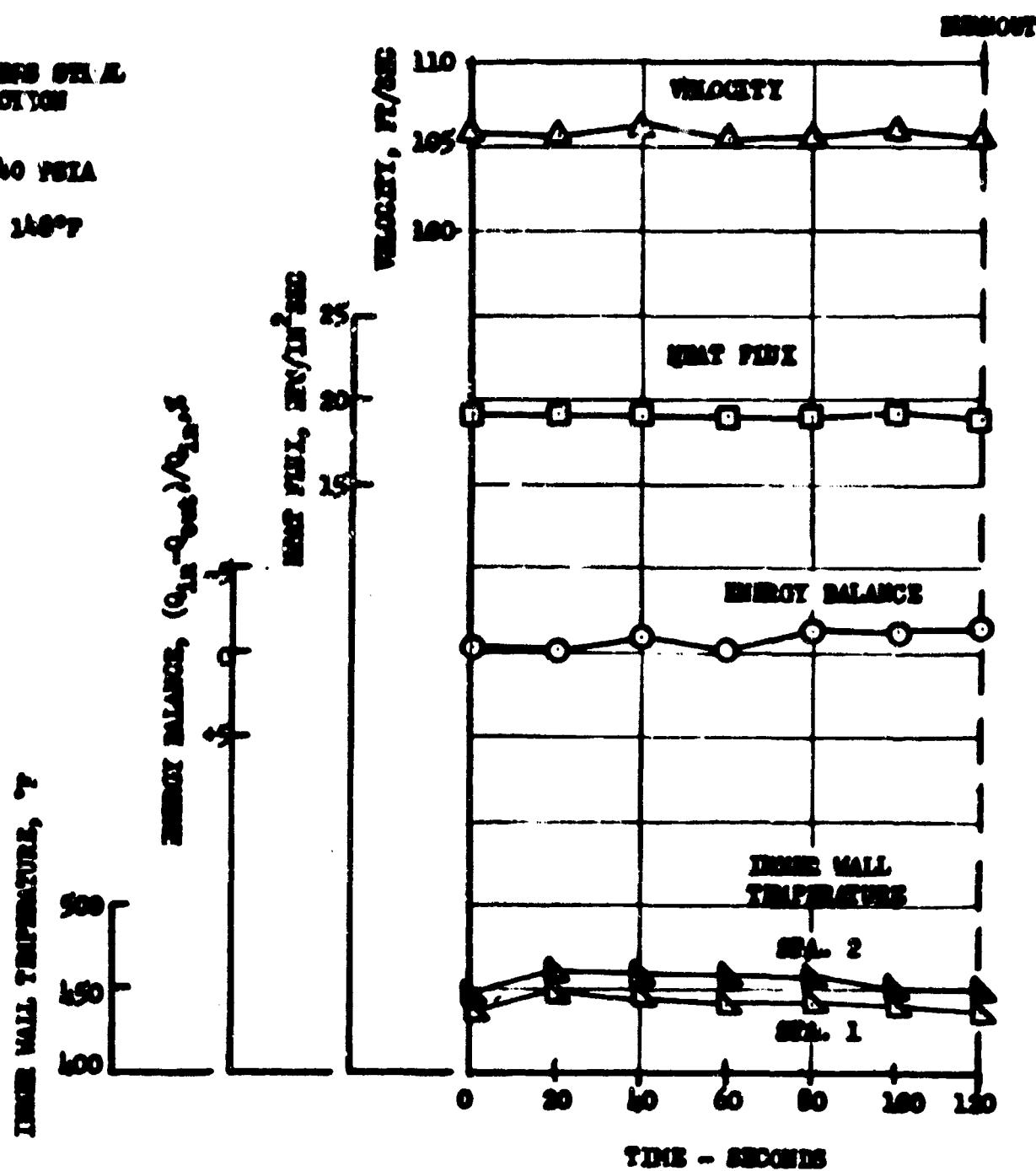


Figure 32. 98% H_2O_2 Extended-Duration Test Parameters, Test 142

INCONEL 718
TEST SECTION

$P_{OUT} = 3500 - 3600 \text{ PSIA}$

$T_{B OUT} = 130^\circ\text{F}$

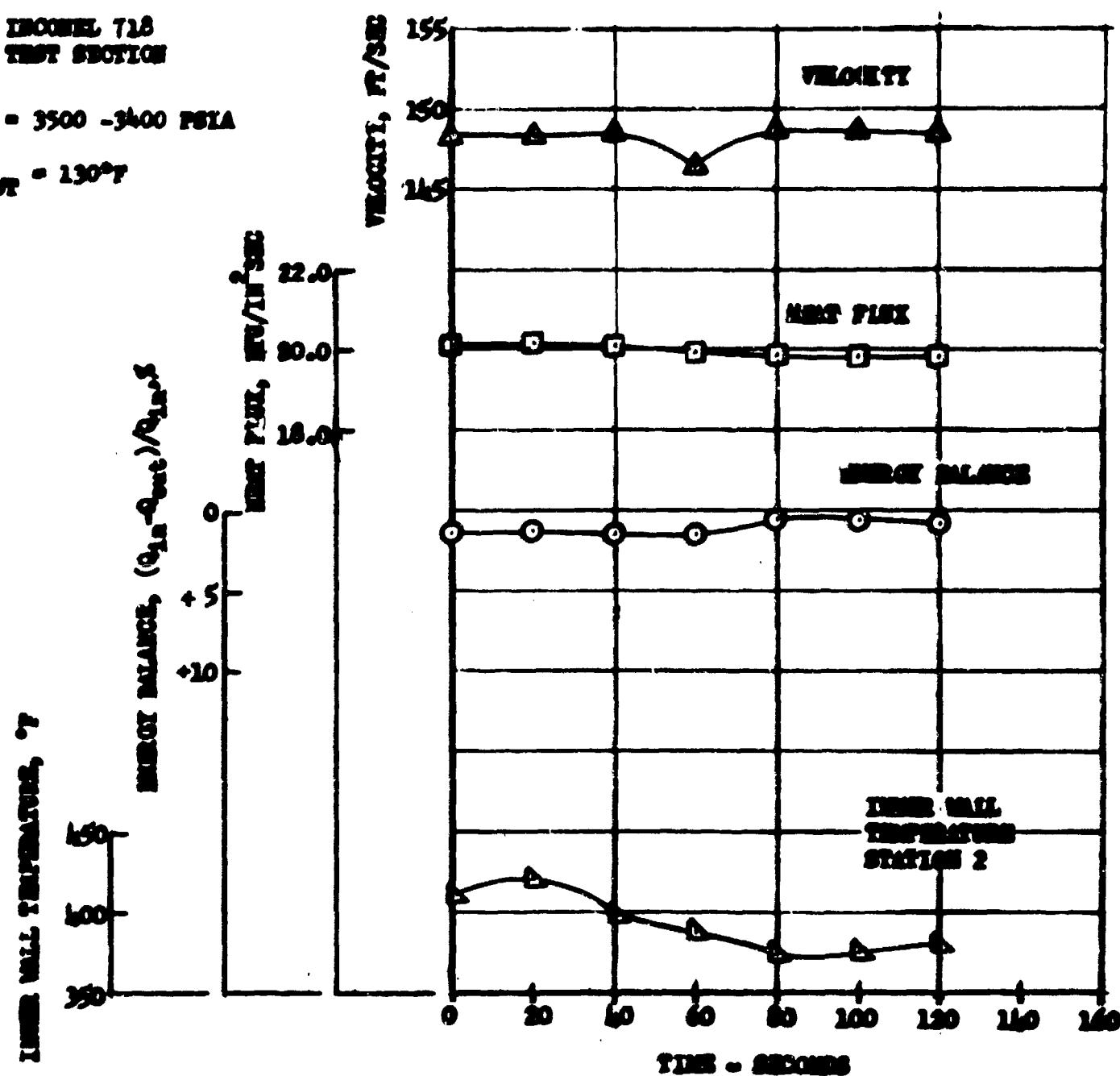


Figure 33. 90% H_2O_2 Extended-Duration Test Parameters, Test 132

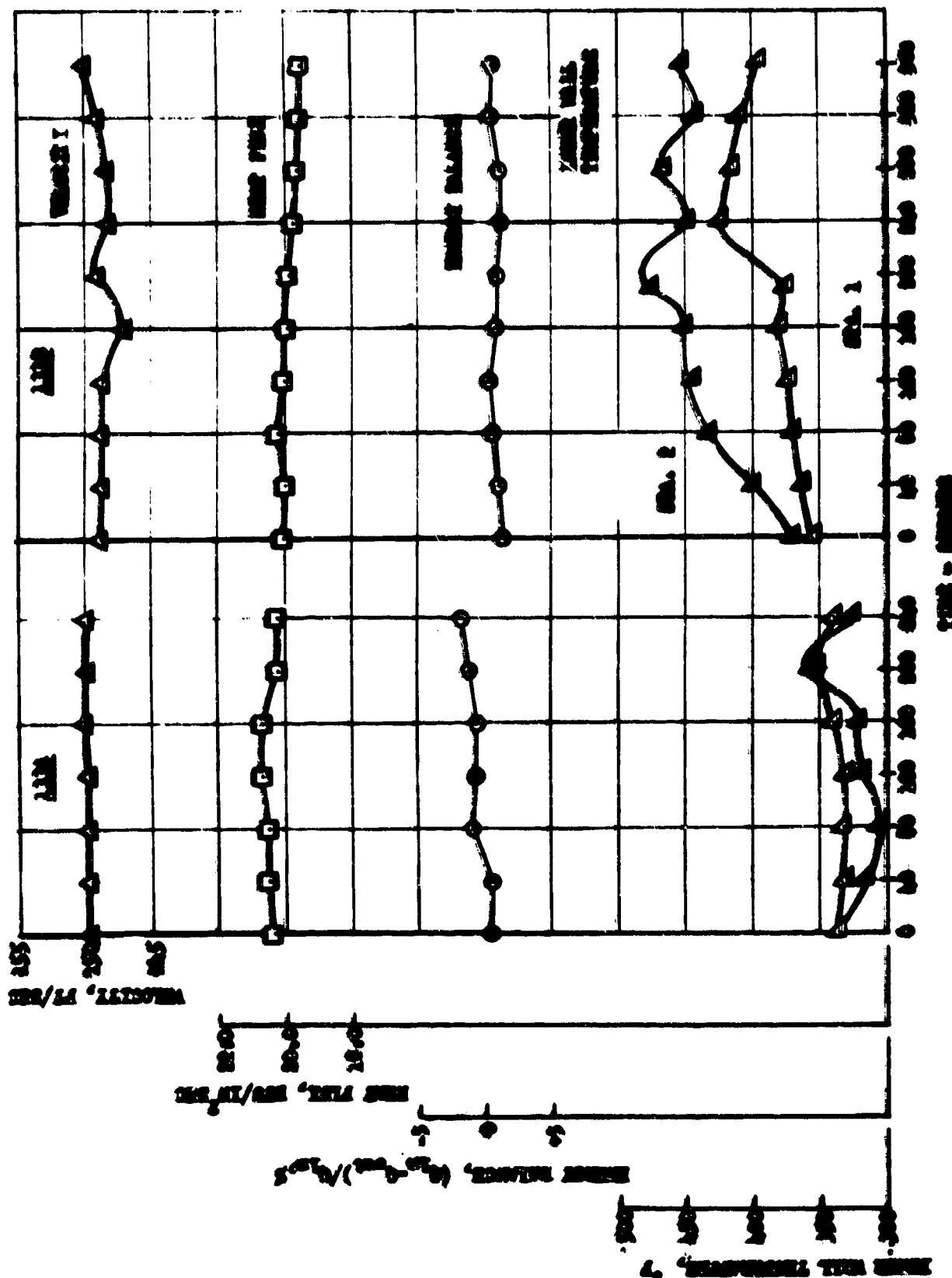


Figure 34. 98% H₂O₂ Extended-Duration Test Parameters, Test 133

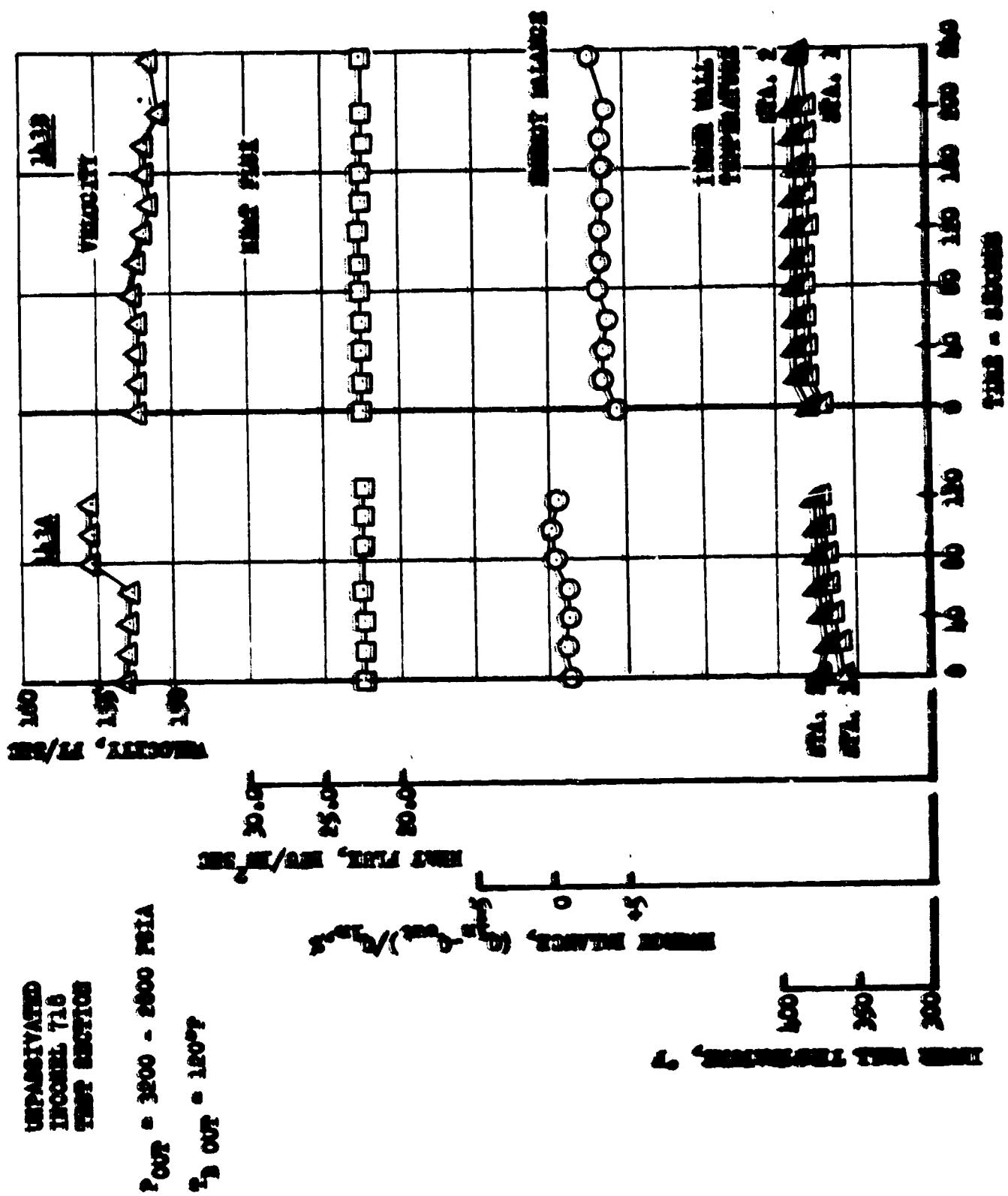


Figure 35. 90% H_2O_2 Extended-Duration Test Parameters, Test 143

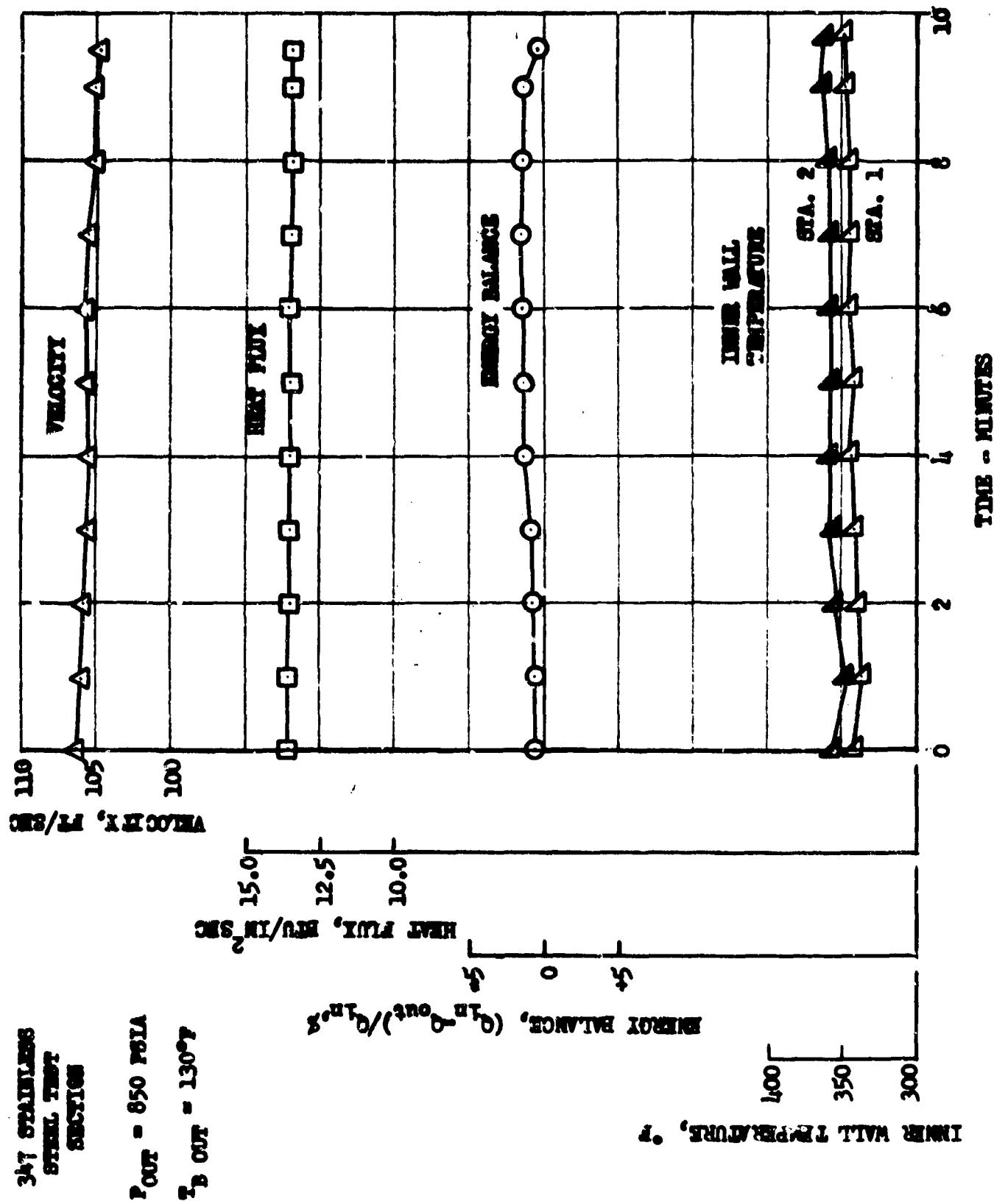


Figure 36. 98% $^{12}\text{O}_2$ Extended-Duration Test Parameters, Test 140

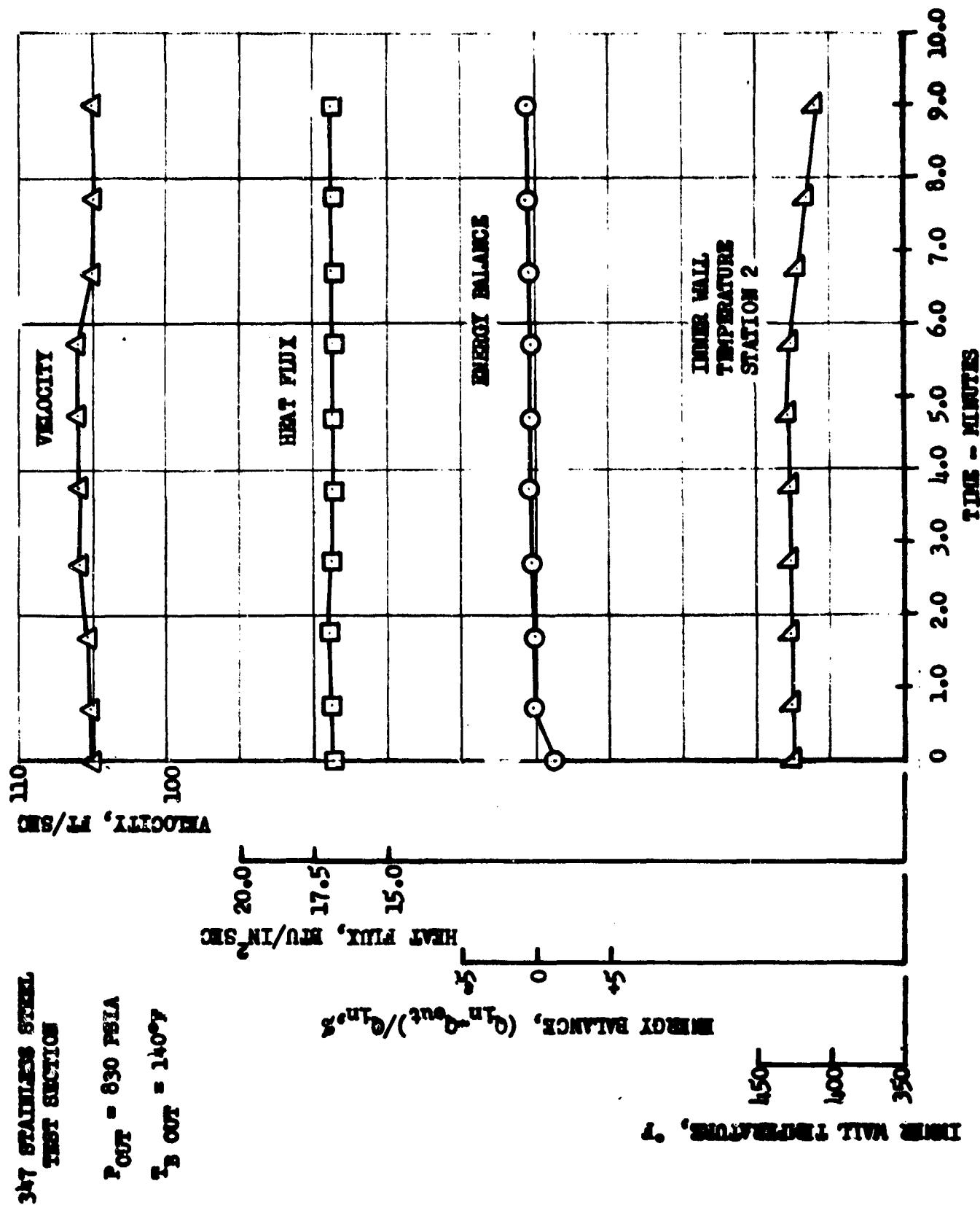


Figure 37. 98% H_2O_2 Extended-Duration Test Parameters, Test 141

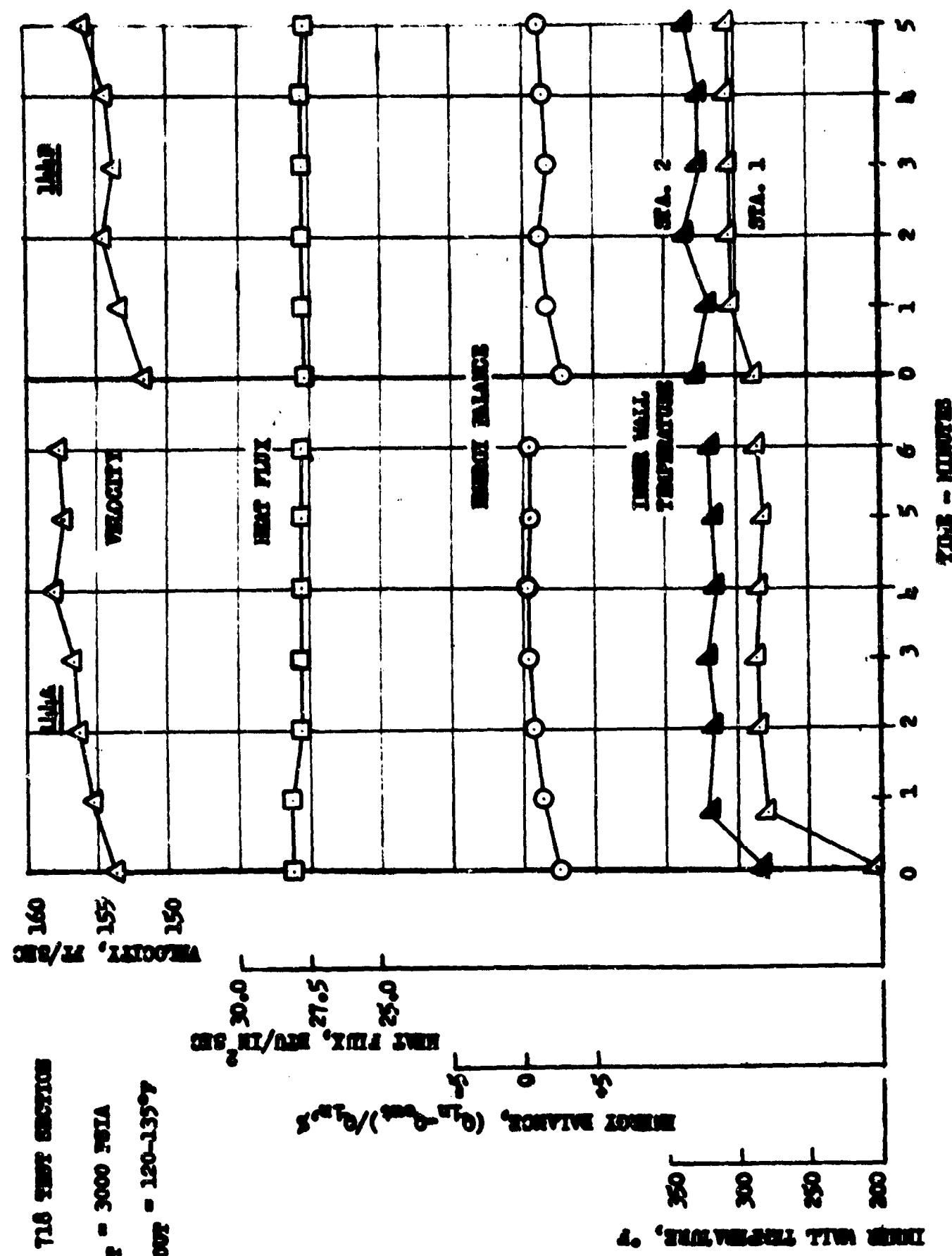


Figure 38. Water Extended-Duration Test Parameters, Test 144

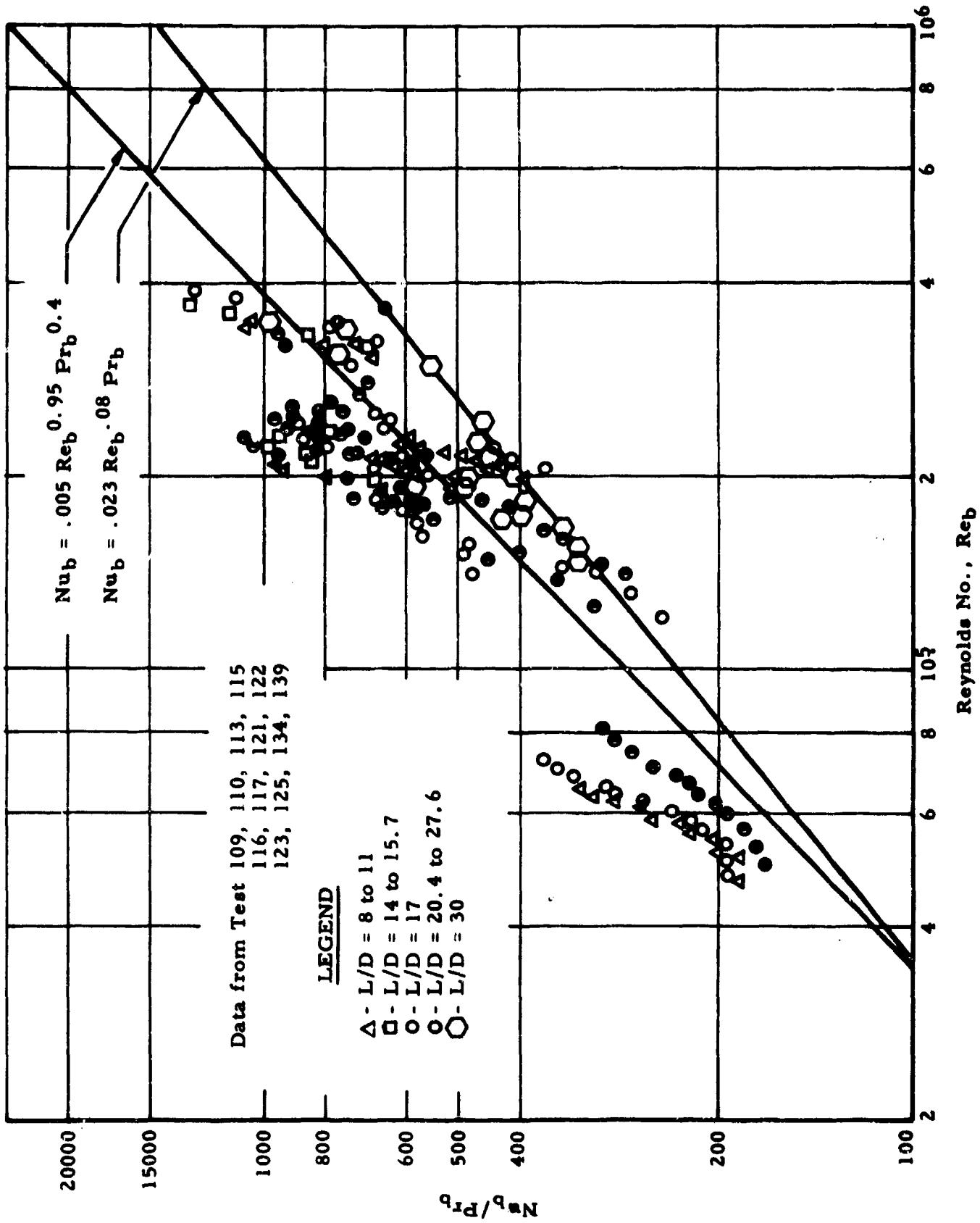


Figure 39. 99% H_2O_2 Forced-Convection Data Correlation Based on Bulk-Temperature Properties

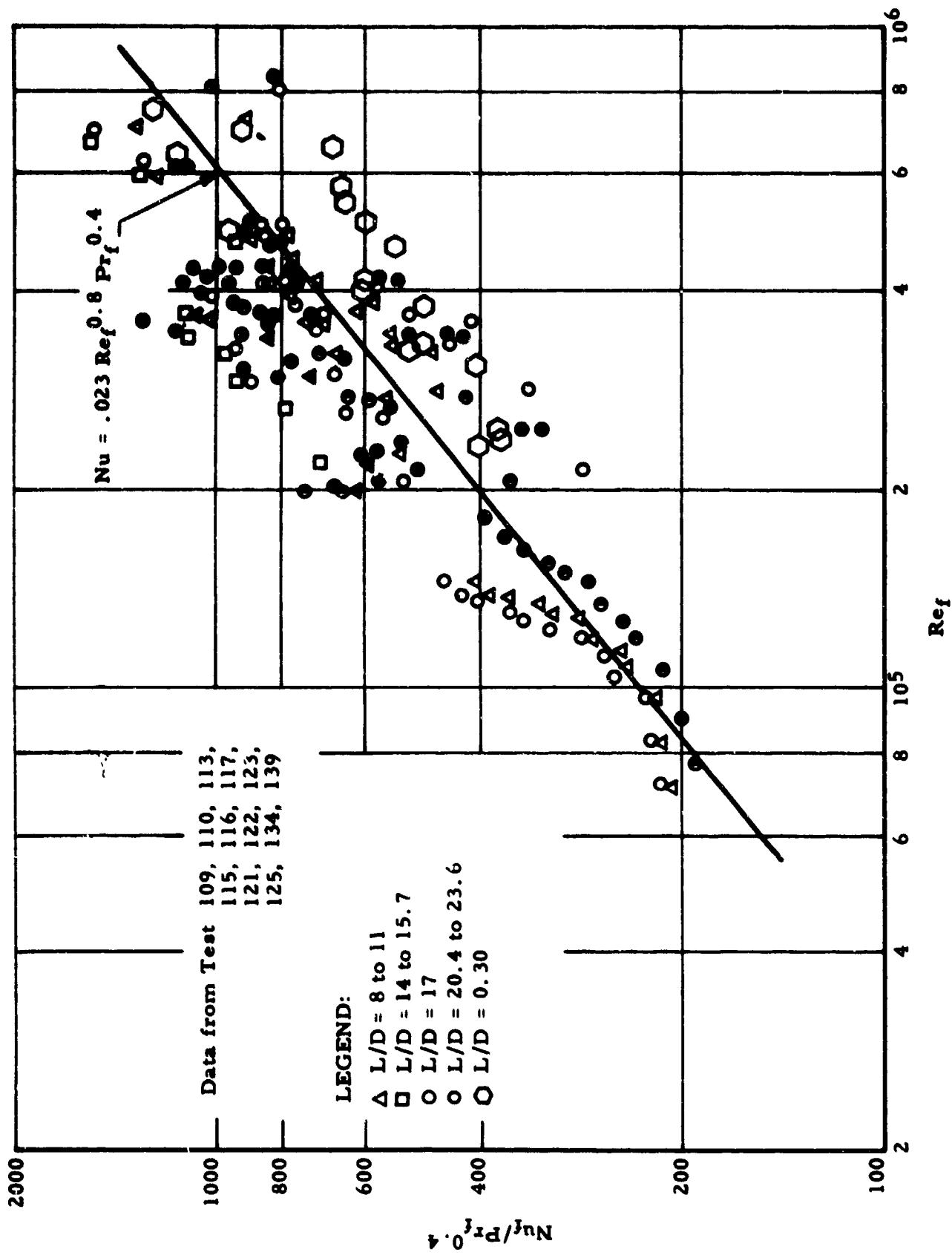


Figure 40. 98% H₂O₂ Forced-Convection Data Correlation Based on Film-Temperature Properties

LEGEND

- ▲ - ID = 0. 220 IN.
- - ID = 0. 159 IN.
- - - DRAWN TUBING: $\epsilon = 0. 000005$ FT.
- SHADED: $T_b = 200^\circ F$
- UNSHADED: $T_b = 70^\circ F$
- ϵ/D = RELATIVE ROUGHNESS
- CURVES FROM REFERENCE 19

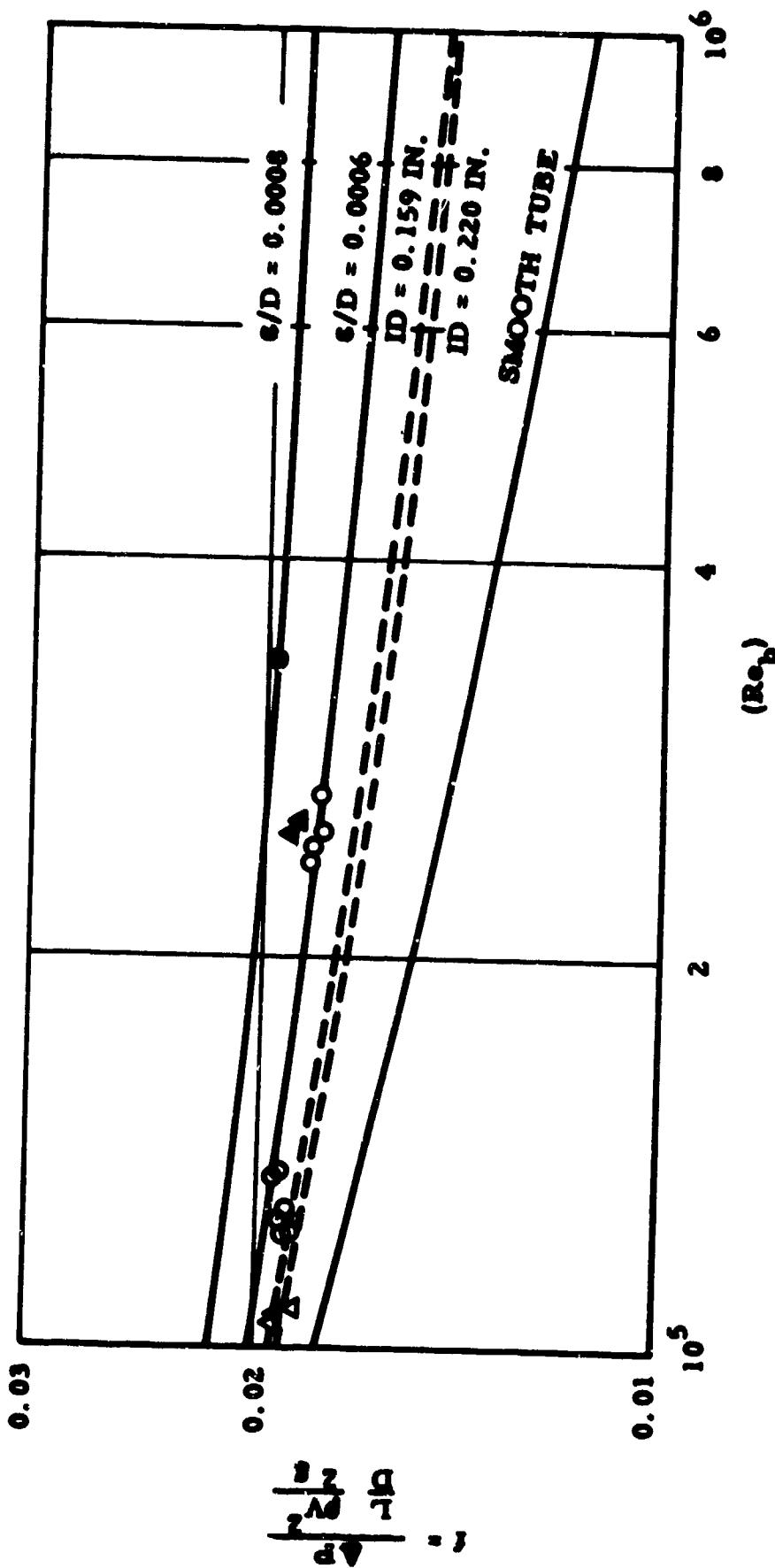
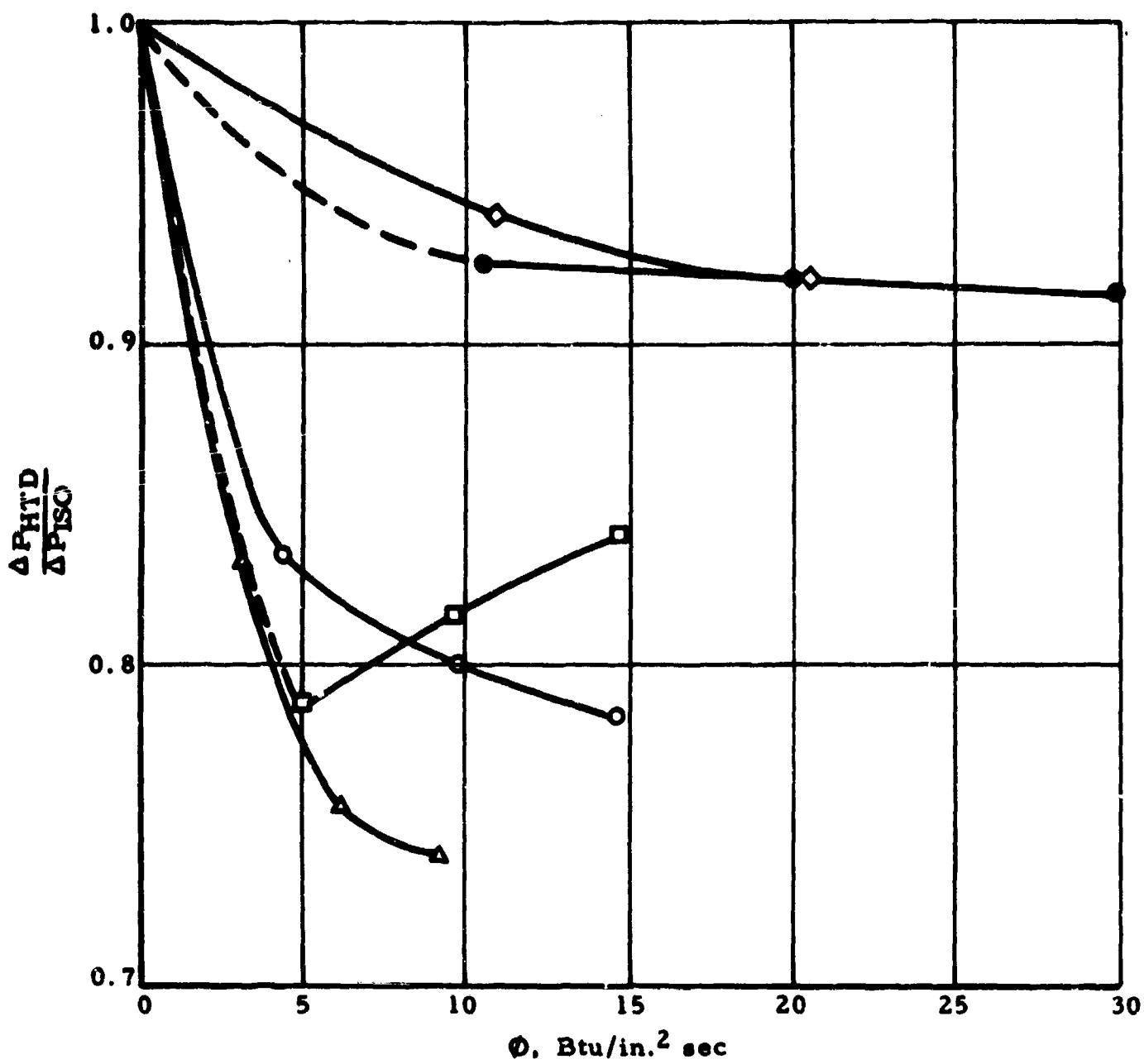


Figure 41. $984^\circ H_2O$ Isothermal Friction Factors



<u>Symbol</u>	<u>Velocity</u>	<u>Pressure</u>	<u>Test</u>
◊	185	3000	123
●	188	3500	125
○	97	3900	121
□	98	4400	122
△	55	4100	119

Figure 42. Pressure-Drop Data for Heated 98% H_2O_2

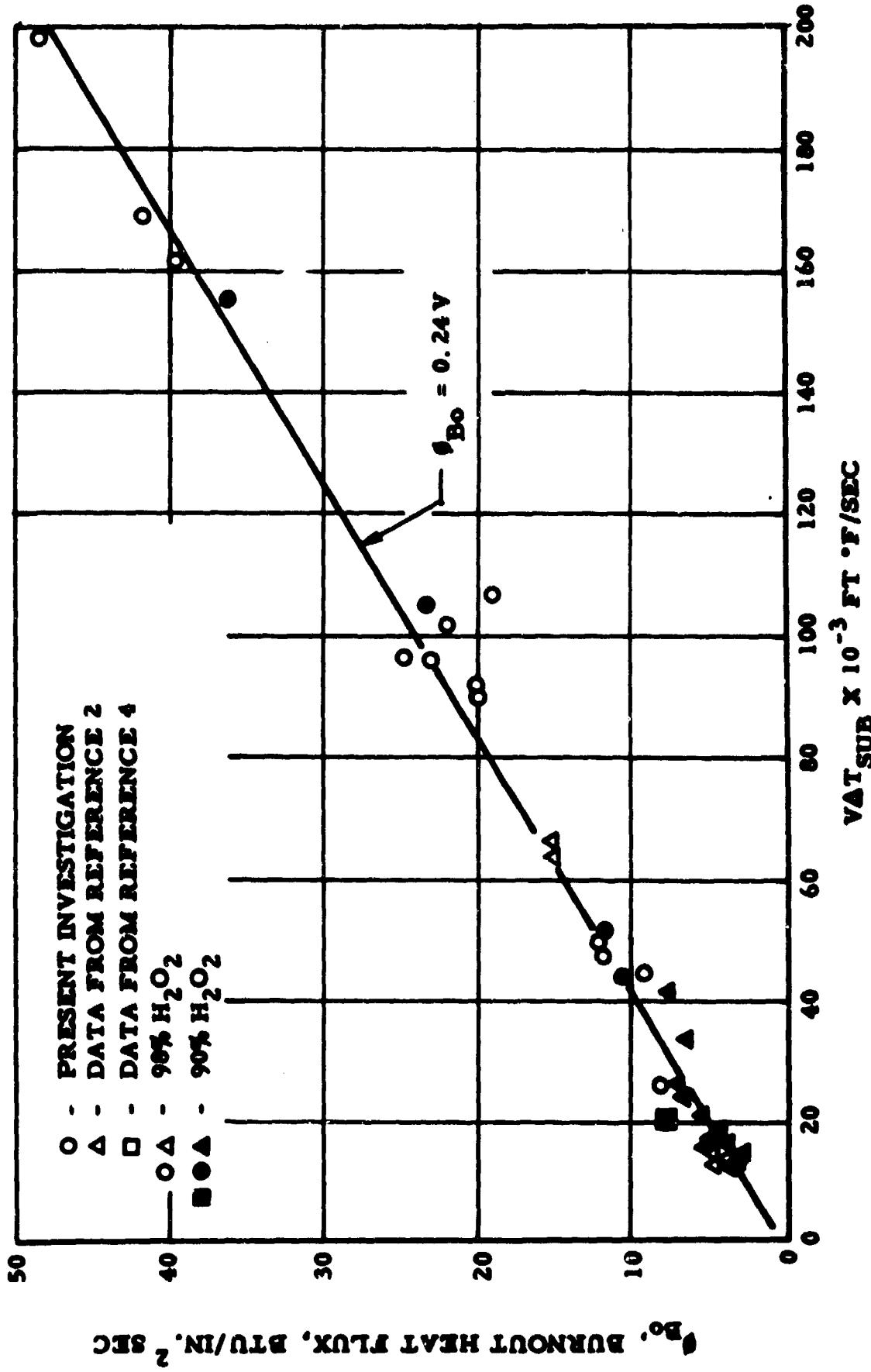


Figure 43: Comparison of 90% H_2O_2 and 98% H_2O_2 Burnout Test Results

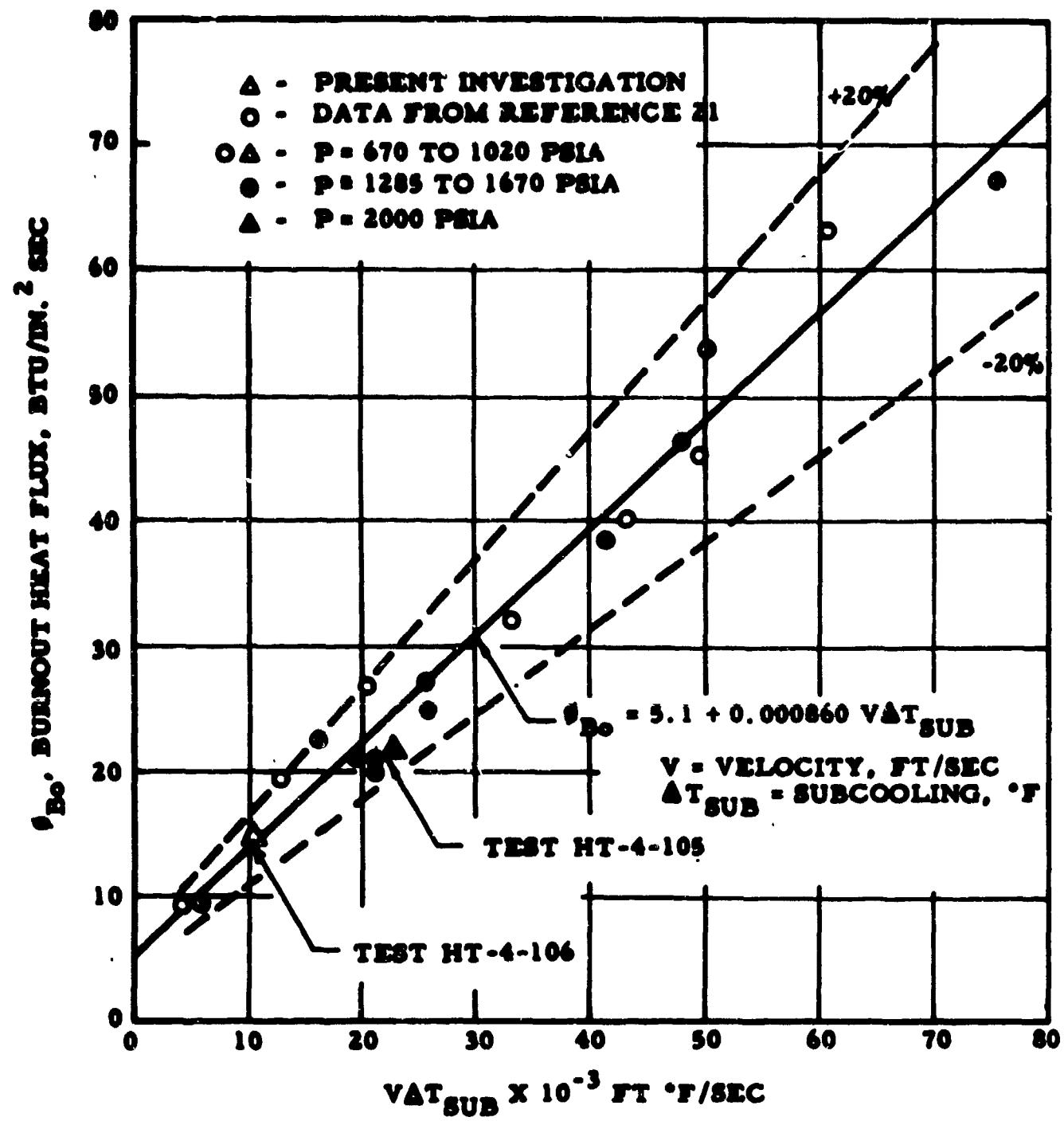


Figure 44. Water Burnout Heat-Flux Data

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APPENDIX A

TEST-SECTION METALLOGRAPHIC EXAMINATIONS

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APPENDIX A

TEST-SECTION METALLOGRAPHIC EXAMINATION

Two of the Inconel 718 test sections in which burnout occurred with 98% H₂O were sectioned and examined for evidence of chemical attack. These test sections had been used in Tests HT-4-110 and HT-4-130.

Test 110 was a burnout test in which tube failure occurred at the following local conditions: heat flux, 41.5 Btu/in.² sec; velocity, 169 ft/sec; bulk temperature, 154°; pressure, 2910 psia.

Test 130 was an extended-duration test which terminated in burnout three minutes after steady state had been achieved at a heat flux of 28 Btu/in.² sec. The test-section outlet conditions for this test were velocity, 150 ft/sec; outlet pressure, 3300 psia; and outlet bulk temperature, 135°F.

The investigations and their results are discussed in the following two Materials R&D reports.

I.

MATERIALS R&D REPORT LRD 65-344

PURPOSE. To determine the material condition of an Inconel 718 heat-transfer test specimen (tubing) after exposure to hot, flowing hydrogen peroxide.

CONCLUSION. The Inconel 718 tubing material was not attacked by the hot, flowing hydrogen peroxide.

INVESTIGATION AND RESULTS. A section of annealed Inconel 718 tubing was submitted for observation after it was utilized in a heat-transfer test, in which 98% H₂O₂ was flowed through the tubing (heated electrically) until a burnout occurred. The tubing was cross-sectioned in the center (midway between the two electrical connections) and close to the point of burnout. These two sections were compared to a control specimen (i.e., a section of tubing that had not been exposed to H₂O₂) to determine the effect of H₂O₂ on the tube material (Figure 1). The total duration of testing was 3 min (from start to burnout). Power was increased gradually during this time until the burnout occurred. The average inner wall temperature at the end of the test was calculated to be 600°F.

Examination of the inner wall of the tubing showed that the hot H₂O₂ had very little, if any, effect on the Inconel 718 material. At a magnification of 500X the tube wall still appears to be relatively smooth, and no signs of intergranular attack are present (Figure 1).

DISCUSSION. The tubing utilized in heat-transfer testing is in the annealed condition. For heat-transfer test purposes, annealed Inconel 718 will give the same results as solution-annealed and aged material. However, for compatibility studies, the material should be tested in the condition in which it will be utilized in the finished hardware. If the Inconel 718 tubing will be solution-annealed and aged when put into service, it should be compatibility-tested in the same condition. The aging treatment of this material causes precipitation of a constituent by which the material is strengthened. Precipitation of a constituent sometimes changes the corrosion-resisting properties of a material, especially at the grain boundaries. In a previous compatibility study, tests indicated that hot N₂O₄ attacked solution-annealed and aged Inconel 718 at the grain boundaries.* Hydrogen peroxide may have the same effect on the material. Further, the test duration should be increased to equal the proposed life of the chamber tubes.

RECOMMENDATIONS. Solution-annealed and aged Irconel 718 tubing should be utilized in compatibility testing with the hot, flowing hydrogen peroxide.

Compatibility testing duration should be equivalent to the planned service life of the chamber tubes.

*Bechtold, R. F., Materials Development Report DVR 64-365, Aerojet-General Corporation, Liquid Rocket Components Department 4630, 15 July 1964.

II.

MATERIALS R&D REPORT FSC 66-135

PURPOSE. To determine if premature "burnthrough" of an Inconel 718 heat-transfer test specimen (tubing) was caused by corrosion attack.

CONCLUSIONS. The Inconel 718 tube material was not attacked (corroded) by the tube coolant (hydrogen peroxide).

Overheating of the tube at the test conditions of pressure and flow rate caused the tube to rupture.

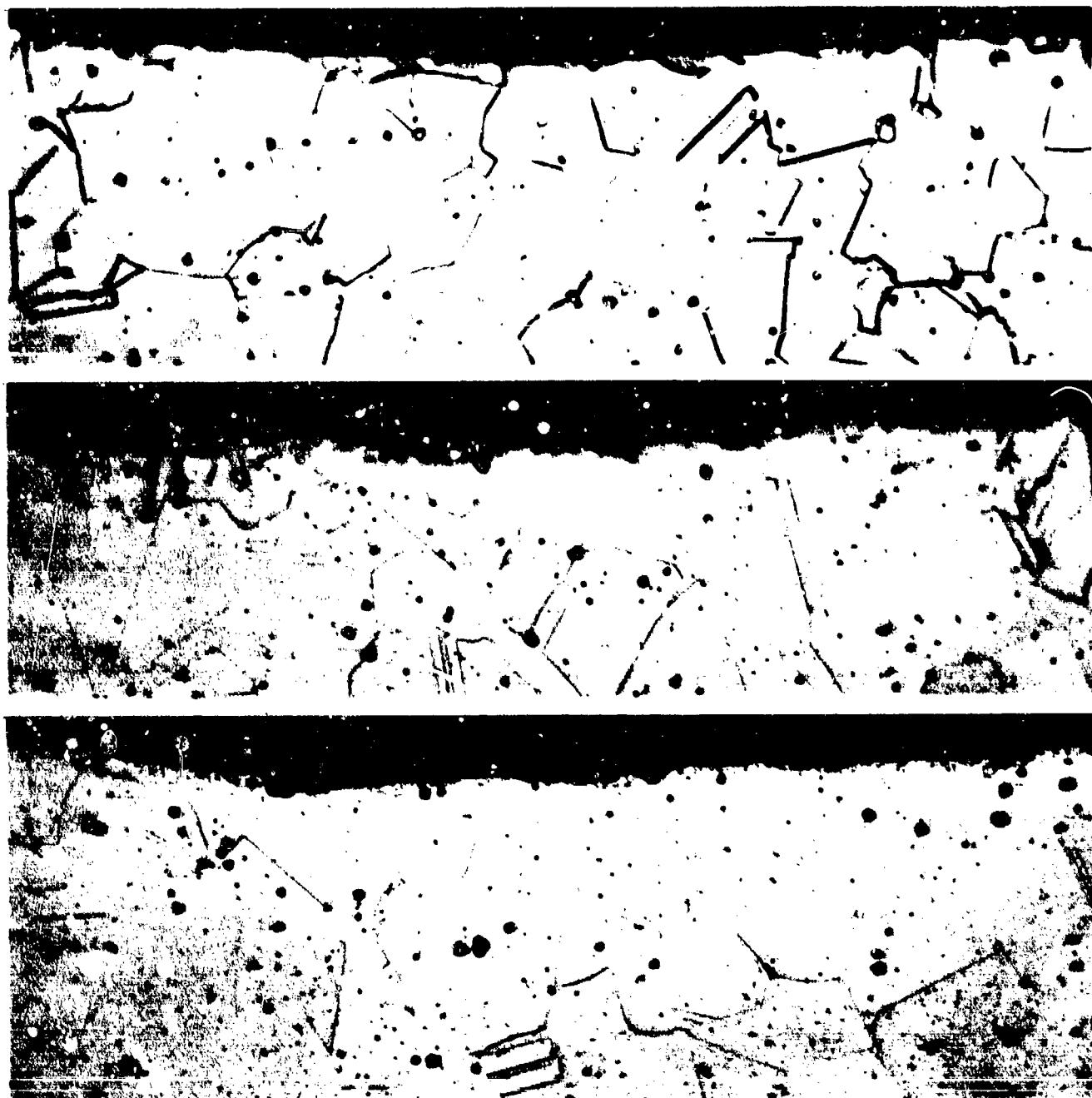
HISTORY. Heat-transfer Test Specimen HT-4-130 (annealed 3/16-in.-dia Inconel 718 tubing) had been undergoing testing at a heat flux of 28 Btu/in.² sec (electrical resistance heating) for about 3 min when a rupture occurred 1 in. from the downstream electrode (Figures 2 and 3). Hydrogen peroxide with a concentration of 98% was flowing at a pressure of about 3000 psi through the tube at a rate of 150 ft/sec at the time of failure. Calculations indicate that the outer and inner wall temperatures were 1200 to 1300°F and 400 to 500°F, respectively, shortly before failure.

VISUAL OBSERVATIONS. Three cross-sections of the tube were mounted and polished for examination. Two cross-sections of the tube were taken in the immediate rupture area (Figures 4 and 5), and the third was taken about 1/4 in. away (Figure 6). Figure 5 shows that the tube melted completely through. No evidence of corrosion attack on the inner wall is present, and the inner surface of the tube appears to be relatively smooth even at a magnification of 500X (Figure 6). The tube wall thickness (0.015 in.) was unchanged by testing except in the immediate rupture area where it thinned to 0.014 in.

DISCUSSION. The tube specimen sustained a heat flux of 28 Btu/in.² sec for 3 min before rupture occurred. Heat-transfer data indicated that the tube should have been able to withstand the applied heat flux, fluid pressure (about 3000 psi), and coolant (hydrogen peroxide) flow rate without failure. However, the appearance of the failure indicates that overheating and melting initiated tube rupture. No evidence of corrosive attack was found, and the tube wall thickness was unchanged (except in the immediate rupture area where the reduction-in-area effect due to yielding thinned the tube).

Although short-duration heat-transfer data indicate that the tube material should withstand the conditions applied to the failed tube, several other heat-transfer test sections have failed during extended-duration operation at similar test conditions. Apparently, an unknown factor (possibly a catalytic reaction between the surface layer of the tube material and the hydrogen peroxide) remains to be determined. Further testing is necessary to determine the combination of maximum heat flux, pressure, and flow rate the Inconel 718 tube material will withstand.

RECOMMENDATIONS. Investigate and test for a catalytic reaction between Inconel 718 and hydrogen peroxide utilizing various temperatures and pressures.



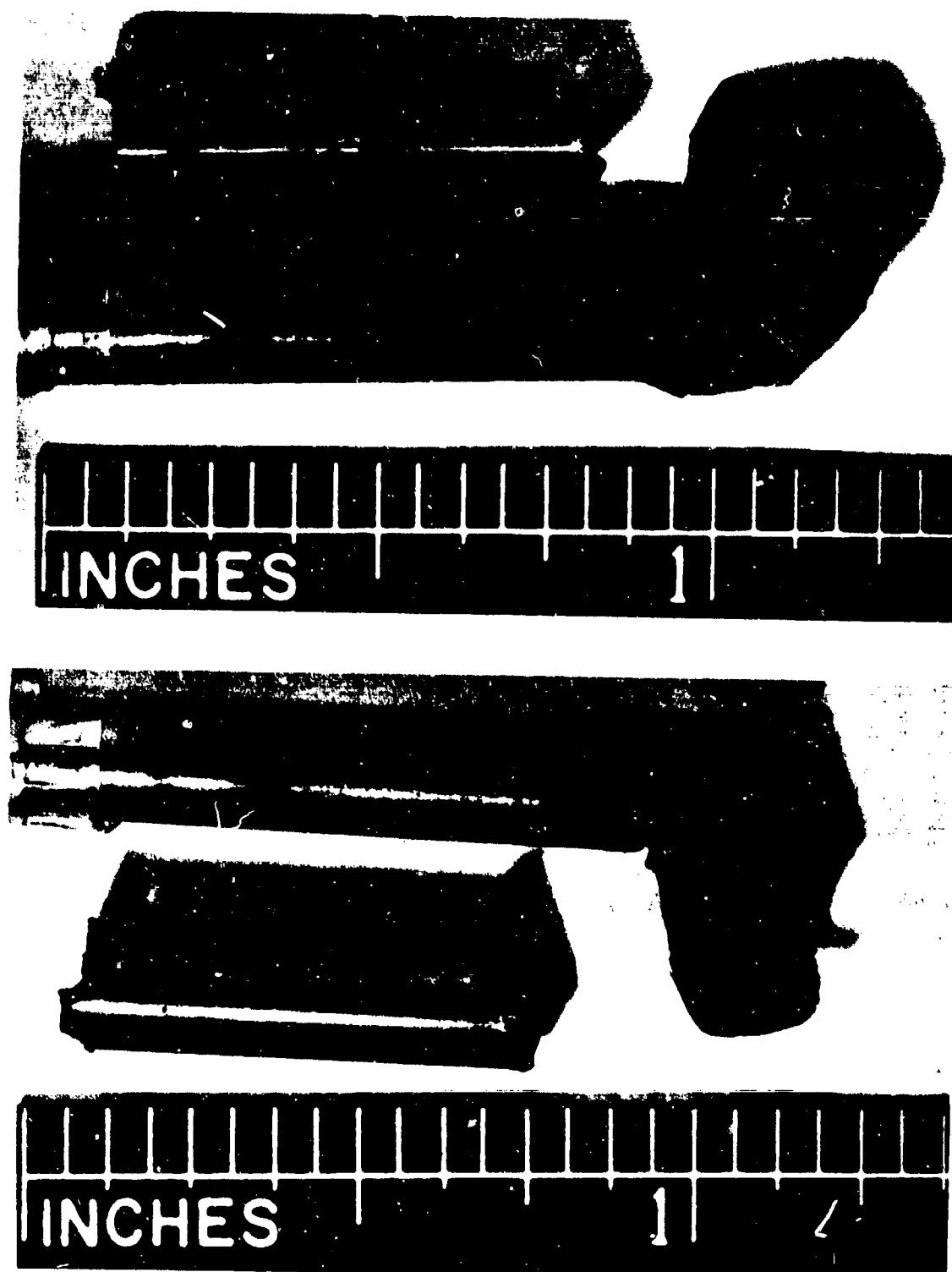
Top: Inside surface of a tube that was not exposed to hot H₂O₂ (control specimen)

Center: Inside surface of a tube section cut from the approximate midpoint of the heat-transfer test specimen.

Bottom: ID area of a tube section cut approximately 3/16 in. from the burnout area (high temperature area).

The relatively smooth inside surface of the heat transfer test tubing indicates that no corrosion occurred during testing. No intergranular attack is evidenced. (Black spots in the material were caused by the etchant)

Figure 1. Photomicrographs Showing the Inside Surface (Tube ID) of the Inconel 718 Tubing Material (Magnification 500 X; Etchant-- HNO₃, HCl, HF and H₂O)



Top: outer surface
Bottom: inner surface

Mag: 4X

Figure 2. Photographs of the Rupture Edges of the Tube (Right Side on Both Tubes). Arrows point to the area which appears to be the initial rupture area (see Figure 3).

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Mag: 13X

Figure 3. Probable Area of Rupture Initiation (Areas of melted metal and several cracks appear. The microstructure of this area appears in Figure 4).

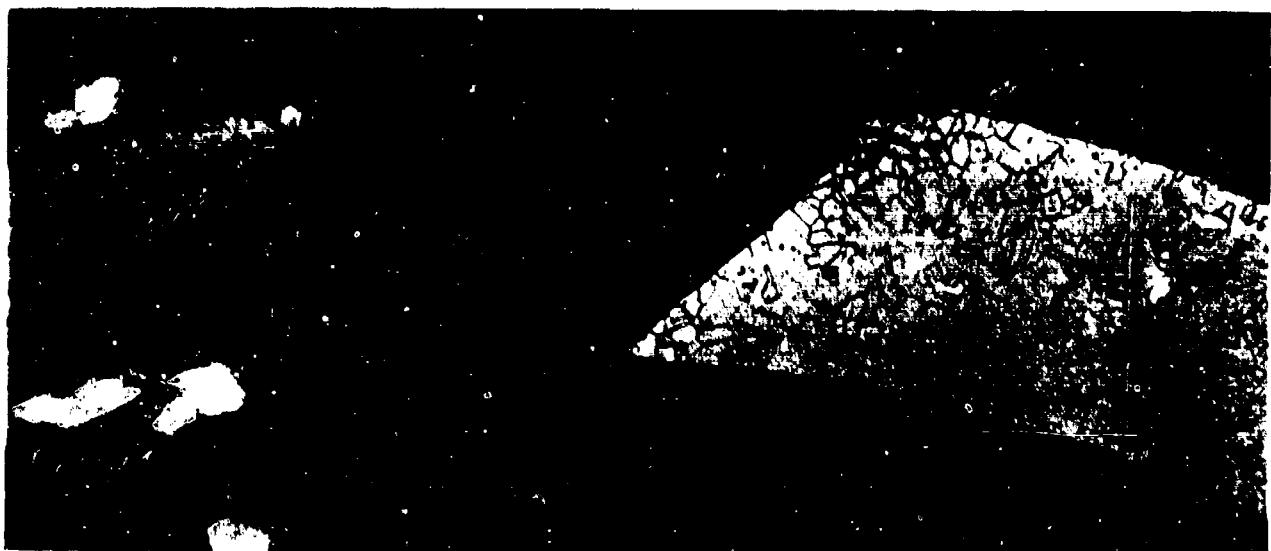


Etchant -- HNO_3 , HCl , HF & H_2O

Mag: 150X

Figure 4. Microstructure of the Tube in the Initial Failure Area. The OD of the tube is at the top of the photograph. Melted tube metal (darkened metal) appears in the center of the thinned area. Incipient melting at the grain boundaries probably initiated intergranular cracking (indicated by arrows).

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Etchant -- HNO_3 , HCl , HF & H_2O

Mag: 100X

Figure 5. Failure Area of Smaller Tube Section Shown in Figure 2. Darkened metal shows that melting proceeded entirely through the tube. The ID of the tube appears to be unaffected by the hot hydrogen peroxide (no corrosion occurred).

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Etchant: HNO_3 , HCl , HF & H_2O

Mag: 500X

Figure 6. Inside Surface of the Tube Approximately $1/4$ in. from Rupture Area. Staining, caused by the etchant, has darkened the edge, but no indications of corrosion attack are present.

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APPENDIX B

TABULATED HEAT-TRANSFER DATA

The outputs from the data-reduction computer program for the 98% H₂O₂ burnout tests, the extended-duration and heated pressure-drop tests, and the 90% H₂O₂ burnout tests are given on the following pages. The data are listed in numerical order, by test number. The equations for the data-reduction computer program are given in Section II,D of the main body of this report.

The output for each test consists of three sections: overall test parameters, local test parameters, and dimensionless parameters. The nomenclature for each section is described below.

Overall Test Parameters

AF	=	Test section flow area, ft ²
D	=	Test section inside diameter, ft
L	=	Heated length, in.
DELTA TO	=	Bulk temperature rise observed prior to application of test section power, °F
POINT, DATA POINT	=	Refers to a heat-flux level in the burnout tests and a certain time in the extended-duration tests
PB-IN	=	Inlet pressure, psia
PB-OUT	=	Outlet pressure, psia
TB-IN	=	Inlet bulk temperature, °F
TB-OUT	=	Outlet bulk temperature, °F
W	=	Flow rate, lb/sec
E2	=	Overall test-section voltage drop
I2	=	Test-section current, amp
QP	=	Electrical power, Btu/sec
HT BAL	=	Heat balance, %
G	=	Mass velocity, lb/sec ft

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Local Test Parameters

STA	=	Refers to axial position where wall temperature was measured.
P _L	=	Local pressure, psia
T _B	=	Local bulk temperature, °F
T _W	=	Measured outside wall temperature, °F
T _I	=	Calculated inside wall temperature, °F
Q/A	=	Heat flux calculated from wall temperature gradient, Btu/in. ² sec
Q/AP	=	Heat flux calculated from voltage and current measurements, Btu/in. ² sec
H	=	Heat-transfer coefficient based on Q/AP, Btu/in. ² sec °F
DEL T _T	=	T _I - T _B
V _S	=	Local coolant velocity, ft/sec
L/D	=	Length-to-diameter ratio based on length between data station and upstream end of heated length
DELTA E	=	Voltage drop
LE	=	Length over which ΔE was measured, in.

Dimensionless Parameters

HU	=	Husselt number based on bulk-temperature properties
PR	=	Prandtl number based on bulk-temperature properties
RE	=	Reynolds number based on bulk-temperature properties
T _I /T _B	=	Ratio of inside wall temperature to bulk temperature, °R/°R
HU/PR(0.4) =		Husselt No./ (Prandtl No.) ^{0.4}
BHO RATIO =		Ratio of bulk-temperature density to wall-temperature density

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Dimensionless Parameters (cont.)

K RATIO = Ratio of bulk-temperature thermal conductivity to wall-temperature thermal conductivity

MU RATIO = Ratio of bulk-temperature viscosity to wall-temperature viscosity

CP RATIO = Ratio of average specific heat to bulk-temperature specific heat, where:

$$\text{average specific heat} = \bar{C}_p = \frac{\int_{T_b}^{T_w} C_p dT}{T_w - T_b}$$

MU(F) = Nusselt number based on average film-temperature properties

PR(F) = Prandtl number based on average film-temperature properties

RE(F) = Reynolds number based on average film-temperature properties

TI/TF = Ratio of inside wall temperature to average film temperature, °R/°R

TF = 1/2 (TB + TI)

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Liquid Side Heat Transfer Test Data

Overall Test Parameters

TEST HT-4-109 DATA POINT 7 IS BURNOUT

AF = 0.138E-03 D = 0.132E-01 L = 0.400E 01 DELTA TO = 0.200E 01

DATA POINTS

POINT	P6-IN	P9-OUT	TH-IN	TH-OUT	W	E2	I2	Q2	HT-80	6
1	2.528E 01	2.845E 03	1.275E 04	1.418E 02	1.090E 00	1.499E 01	6.020E 02	8.559E 00	-6.679E -01	7.994E 03
2	3.070E 03	2.986E 03	1.255E 02	1.493E 02	1.110E 00	2.000E 01	1.505E 02	7.943E 02	-3.259E 00	8.043E 03
3	3.070E 03	2.988E 03	1.256E 02	1.591E 02	1.097E 03	2.415E 01	9.521E 02	2.180E 01	-1.971E 00	7.981E 03
4	3.069E 03	2.988E 03	1.257E 02	1.714E 02	1.090E 00	2.016E 01	1.100E 03	2.939E 01	-4.594E 00	7.994E 03
5	3.070E 03	2.988E 03	1.257E 02	1.787E 02	1.033E 03	3.037E 01	1.182E 03	3.404E 01	-6.568E 00	7.954E 03
6	3.074E 03	2.990E 03	1.260E 02	1.892E 02	1.075E 00	3.230E 01	1.259E 03	3.685E 01	-1.807E 01	7.732E 03
7	3.050E 03	2.000E 03	1.264E 02	1.941E 02	1.053E 00	3.264E 01	1.265E 03	3.914E 01	-1.370E 01	7.630E 03

TEST SECTION

Local Test Parameters

TEST PT-4-109 DATA POINT 7 IS BURNOUT

DATA POINT 1

PTA	2D	T ₀	T ₁	T ₂	Q/A	W	DEL TF	VS
1	4.00E-03	1.020E 02	4.040E 02	2.539E 02	4.030E 00	4.420E 20	3.680E-02	9.064E 01
2	4.071E 03	1.073E 02	3.970E 02	2.190E 02	4.365E 00	4.329E 00	5.259E-02	9.032E 01
3	2.063E 03	1.049E 02	4.040E 02	2.303E 02	4.289E 00	4.292E 00	4.774E-02	9.036E 01
PTA	LE	CLTA E	LE	LE				
1	1.016E 01	3.015E 00	1.003E 00	0				
2	1.073E 01	3.073E 00	1.003E 00	0				
3	2.036E 01	2.773E 00	7.500E-01	0				

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LOCAL TEST PARAMETERS

Test FT-4-1C, DATA POINT 7 IS BURNTOUT

DATA POINT 2

STK	P/R	T ₀	T _W	T _I	Q/A	J/AP	H	DEL TF	VS
1	2.00E-02	0.1	0.173E-02	0.2	3.023E-02	7.974E-03	4.140E-02	1.087E-02	9.243E-01
2	2.00E-02	0.2	0.413E-02	0.2	2.051E-02	7.742E-03	7.642E-02	1.094E-02	9.266E-01
3	2.00E-02	0.3	0.470E-02	0.2	2.074E-02	7.570E-03	7.560E-02	1.071E-02	9.290E-01

DATA POINT 3

STK	P/R	T ₀	T _W	T _I	Q/A	J/AP	H	DEL TF	VS
1	1.00E-01	0.1	1.000E-00	0.0	2.000E-02	1.157E-01	1.128E-01	2.0529E-02	9.0151E-01
2	1.00E-01	0.1	1.000E-00	0.0	2.000E-02	1.121E-01	1.130E-01	1.510E-02	9.0184E-01
3	1.00E-01	0.1	1.000E-00	0.0	2.000E-02	1.087E-01	1.091E-01	1.755E-02	9.0217E-01

LOCAL TEST PARAMETERS

Test FT-4-1C, DATA POINT 7 IS CLOUDY

DATA POINT 4

STK	P/R	T ₀	T _W	T _I	Q/A	J/AP	H	DEL TF	VS
1	2.00E-02	0.1	0.403E-02	0.2	4.000E-02	1.574E-01	1.256E-01	3.144E-02	9.114E-02
2	2.00E-02	0.2	0.571E-02	0.2	2.033E-02	1.504E-01	1.499E-01	2.367E-02	9.159E-01
3	2.00E-02	0.3	0.639E-02	0.2	2.020E-02	1.457E-01	1.467E-01	2.735E-02	9.204E-01

LOCAL TEST PARAMETERS

Test FT-4-1C, DATA POINT 7 IS CLOUDY

DATA POINT 5

STK	P/R	T ₀	T _W	T _I	Q/A	J/AP	H	DEL TF	VS
1	1.00E-01	0.1	1.000E-00	0.0	2.000E-02	1.574E-01	1.256E-01	3.144E-02	9.114E-02
2	1.00E-01	0.1	1.000E-00	0.0	2.000E-02	1.504E-01	1.499E-01	2.367E-02	9.159E-01
3	1.00E-01	0.1	1.000E-00	0.0	2.000E-02	1.457E-01	1.467E-01	2.735E-02	9.204E-01

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TEST HT-4-1C5 DATA POINT 7 IS BURNOUT

LOCAL TEST PARAMETERS

DATA POINT 7						
SIA	P _C	T _a	T _b	T _f	Q/A	H
1	2.04E-05	1.469E-02	1.27E-03	4.993E-02	1.41E-01	5.116E-02
2	3.01E-05	1.661E-02	9.60E-02	4.000E-02	1.754E-01	7.234E-02
3	2.55E-05	1.754E-02	9.910E-02	4.339E-02	1.688E-01	6.449E-02

LOCAL TEST PARAMETERS

TEST HT-4-1C5 DATA POINT 7 IS BURNOUT

DATA POINT 6

DATA POINT 6						
SIA	P _C	T _a	T _b	T _f	Q/A	H
1	2.027E-03	1.520E-02	1.192E-03	5.527E-02	2.053E-01	5.023E-02
2	3.016E-03	1.659E-02	1.136E-02	5.255E-02	1.362E-01	5.500E-02
3	2.555E-03	1.652E-02	1.119E-02	5.244E-02	1.301E-01	5.684E-02

LOCAL TEST PARAMETERS

TEST HT-4-1C5 DATA POINT 7 IS BURNOUT

DATA POINT 7

DATA POINT 7						
SIA	P _C	T _a	T _b	T _f	Q/A	H
1	3.043E-03	1.560E-02	1.230E-03	6.053E-02	2.042E-01	4.477E-02
2	3.023E-03	1.724E-02	1.180E-03	5.744E-02	1.584E-01	4.894E-02
3	3.003E-03	1.508E-02	1.150E-03	5.351E-02	1.986E-01	5.700E-02

LOCAL TEST PARAMETERS

TEST HT-4-1C5 DATA POINT 7 IS BURNOUT

DATA POINT 8

DATA POINT 8						
SIA	P _C	T _a	T _b	T _f	Q/A	H
1	1.010E-01	6.360E-02	1.003E-00	1.003E-00	2.011E-01	4.477E-02
2	1.072E-01	1.431E-01	1.750E-00	1.750E-00	1.984E-01	4.894E-02
3	1.030E-01	1.431E-01	1.750E-00	1.750E-00	1.986E-01	5.700E-02

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DIMENSIONLESS PARAMETERS

TEST PT-4100 DATA POINT 7 IS TURNOUT

DATA POINT	SIA	AU	PB	ME	TI/TB	MJ/PN(=4)
1	1	2	2.04E-04 9.057E-02	2.0304E-05 2.0064E-05	1.2023E-05 1.0578E-05	4.3159E-02 6.1990E-02
1	2	2	2.08E-04 7.043E-02	2.1244E-05 2.0463E-05	1.1496E-05 1.3150E-05	5.6540E-02 4.8703E-02
2	2	2	2.08E-04 1.03E-03	2.0192E-05 2.0053E-05	1.1813E-05 1.0303E-05	8.3036E-02 7.1050E-02
2	2	2	1.03E-04 1.03E-03	2.0292E-05 2.0053E-05	1.2091E-05 1.0303E-05	7.1050E-02 5.2772E-02
2	2	2	2.08E-04 1.02E-03	2.01753E-05 2.0053E-05	1.4213E-05 1.0303E-05	6.5914E-02 5.2772E-02
2	2	2	2.0537E-04 1.0157E-03	2.02752E-05 2.0053E-05	1.2488E-05 1.0303E-05	6.7503E-02 7.5154E-02
2	2	2	2.00653E-04 9.0459E-04	2.03809E-05 2.0053E-05	1.2845E-05 1.0303E-05	7.5154E-02 5.7839E-02
2	2	2	2.00631E-04 9.0466E-04	2.02452E-05 2.0053E-05	1.5190E-05 1.0303E-05	6.4899E-02 6.4899E-02
2	2	2	2.00631E-04 9.0466E-04	2.03672E-05 2.0053E-05	1.4498E-05 1.0303E-05	6.5914E-02 6.5914E-02
2	2	2	2.04E-04 1.02E-03	2.05252E-05 2.0053E-05	1.4351E-05 1.0303E-05	6.5914E-02 6.1229E-02
2	2	2	2.02505E-04 1.01316E-03	2.02492E-05 2.0053E-05	1.5066E-05 1.0303E-05	6.6718E-02 6.0533E-02
2	2	2	2.0575E-04 1.00551E-02	2.04197E-05 2.0053E-05	1.38223E-05 1.0303E-05	6.6718E-02 6.0533E-02
2	2	2	2.07455E-04 9.07181E-02	2.06065E-05 2.0053E-05	1.4149E-05 1.0303E-05	6.0533E-02 6.0533E-02
2	2	2	2.04703E-04 9.07181E-02	2.02900E-05 2.0053E-05	1.0504E-05 1.0303E-05	6.0456E-02 6.0456E-02
2	2	2	2.05329E-04 9.07032E-02	2.05031E-05 2.0053E-05	1.5656E-05 1.0303E-05	5.0687E-02 5.0687E-02
2	2	2	2.02229E-04 9.07032E-02	2.07263E-05 2.0053E-05	1.3252E-05 1.0303E-05	7.1554E-02 7.1554E-02
2	2	2	2.07032E-04 9.07032E-02	2.02722E-05 2.0053E-05	1.7293E-05 1.0303E-05	5.4054E-02 5.4054E-02
2	2	2	2.04070E-04 9.06615E-02	2.05063E-05 2.0053E-05	1.0332E-05 1.0332E-05	6.0570E-02 6.0570E-02
2	2	2	2.01603E-04 9.03392E-02	2.07497E-05 2.0053E-05	1.5292E-05 1.0303E-05	7.2302E-02 7.2302E-02

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TEST HT-4-109 DATA POINT 7 IS SUBMIT

DIMENSIONLESS PARAMETERS

DATA POINT	STA	MU(F)	P(F)	R(E,F)	T(L/F)	T(L/F)
1	1	6.3334E-02	2.1216E-00	2.8177E-05	1.0919E-00	4.6879E-02
1	2	9.1955E-02	2.3245E-00	2.6222E-05	1.0264E-00	6.5571E-02
1	3	6.2819E-02	2.2239E-00	2.7234E-05	1.0490E-00	5.9166E-02
1	4	6.9357E-02	1.7694E-00	3.3160E-05	1.1261E-00	8.8860E-02
2	1	1.2029E-03	2.0916E-00	2.9115E-05	1.0211E-00	5.4989E-02
2	2	1.0087E-03	1.9334E-00	3.1060E-05	1.0947E-00	7.7466E-02
2	3	7.3431E-02	1.5109E-00	3.7398E-05	1.1740E-00	6.2261E-02
3	1	1.2229E-03	1.8118E-00	3.2294E-05	1.1106E-00	3.6202E-02
3	2	1.0332E-03	1.6335E-00	3.0494E-05	1.1246E-00	6.4462E-02
3	3	7.9063E-02	1.3971E-00	4.2164E-05	1.2946E-00	7.1944E-02
4	1	8.7592E-02	1.2434E-00	4.1373E-05	1.1174E-00	7.4531E-02
4	2	8.7327E-02	1.2926E-00	4.3002E-05	1.1787E-00	7.8997E-02
4	3	8.7327E-02	1.2926E-00	4.3002E-05	1.1787E-00	7.8997E-02
5	1	d.JC99E	1.2149E-00	4.4700E-05	1.2206E-00	7.6834E-02
5	2	1.1946E-03	1.6425E-00	3.9142E-05	1.1605E-00	1.0146E-01
5	3	1.0497E-03	1.2438E-00	4.3143E-05	1.1716E-00	9.8924E-02
6	1	8.1383E-02	1.0816E-00	4.9192E-05	1.2464E-00	7.8866E-02
6	2	8.9117E-02	1.1016E-00	4.8722E-05	1.2230E-00	8.4520E-02
6	3	9.2093E-02	1.0734E-00	5.0220E-05	1.2086E-00	8.9520E-02
7	1	7.2669E-02	9.9146E-01	5.2272E-05	1.2672E-00	7.2892E-02
7	2	7.9435E-02	1.0102E-00	5.1132E-05	1.2403E-00	7.9034E-02
7	3	9.2366E-02	1.0446E-00	5.0526E-05	1.2093E-00	9.0700E-02

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 110 CURRENT CALC EURNOUT AFTER DATA POINT 0

$\Delta t = 0.138E-03$ $D = 0.132E-01$ $L = 0.350E-01$ $\Delta T_{TO} = 0.430E-01$

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	E2	12	30	48	60	72	84
1	3.214E-03	3.014E-03	1.004E-02	1.07E-02	2.030E-00	9.950E-00	4.520E-02	4.264E-00	5.593E-00	5.593E-00	1.472E-00	1.472E-00
2	3.200E-03	3.005E-03	1.000E-02	1.016E-02	2.020E-00	9.990E-00	4.026E-01	9.000E-02	1.729E-01	2.413E-00	1.403E-00	1.403E-00
3	3.197E-03	2.991E-03	9.990E-01	1.033E-02	2.022E-00	1.022E-01	1.390E-03	3.692E-01	-2.232E-01	-2.232E-01	1.393E-01	1.393E-01
4	3.150E-03	2.955E-03	9.930E-01	1.460E-02	1.960E-00	3.610E-01	1.980E-03	8.309E-01	-4.584E-01	-4.584E-01	1.481E-01	1.481E-01
5	3.125E-03	2.930E-03	1.000E-02	1.511E-02	2.000E-00	3.785E-01	1.616E-03	8.777E-01	-2.856E-01	-2.856E-01	1.463E-01	1.463E-01
6	3.105E-03	2.920E-03	1.000E-02	1.539E-02	1.985E-00	3.675E-01	1.642E-03	8.625E-01	-2.632E-01	-2.632E-01	1.453E-01	1.453E-01
7	3.055E-03	2.900E-03	1.000E-02	1.566E-02	1.992E-00	3.980E-01	1.647E-03	6.647E-01	-7.500E-01	-7.500E-01	1.443E-01	1.443E-01
8	3.075E-03	2.885E-03	1.000E-02	1.600E-02	1.965E-00	4.055E-01	1.725E-03	6.631E-01	-7.063E-01	-7.063E-01	1.433E-01	1.433E-01

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 110 CURRENT CALC JURNAL AFTER DATA POINT 3

DATA POINT 1							
STA	P ₀	T ₀	T ₀	T ₀	T ₁	Q/A	H
1	3.114E-03	1.309E-02	2.500E-02	2.52E-02	2.52E-02	2.43E-00	5.895E-02
2	3.074E-03	1.295E-02	2.570E-02	2.55E-02	2.52E-02	2.43E-00	5.951E-02
3	3.028E-03	1.073E-02	2.590E-02	1.87E-02	2.52E-02	2.43E-00	5.848E-02
STA	L/U	DELTA E	LE				
1	1.010E-01	2.550E-00	3.500E-00				
2	1.054E-01	2.550E-00	3.500E-00				
3	2.044E-01	2.550E-00	3.500E-00				

LOCAL TEST PARAMETERS

TEST 110 CURRENT CALC JURNAL AFTER DATA POINT 2

DATA POINT 2							
STA	P ₀	T ₀	T ₀	T ₀	T ₁	Q/A	H
1	3.102E-03	1.053E-02	6.310E-02	2.481E-02	1.021E-01	9.88E-00	7.108E-02
2	3.061E-03	1.129E-02	2.290E-02	2.455E-02	1.321E-01	7.085E-00	7.452E-02
3	3.013E-03	1.167E-02	2.430E-02	2.595E-02	1.020E-01	9.885E-00	6.921E-02
STA	L/U	DELTA E	LE				
1	1.010E-01	2.026E-01	3.500E-00				
2	1.057E-01	2.026E-01	3.500E-00				
3	2.046E-01	2.026E-01	3.500E-00				

LOCAL TEST PARAMETERS

TEST 110 CURRENT CALC JURNAL AFTER DATA POINT 1

DATA POINT 3							
STA	P ₀	T ₀	T ₀	T ₀	T ₁	Q/A	H
1	3.059E-03	1.166E-02	1.065E-03	3.465E-02	2.180E-01	2.112E-01	9.196E-02
2	3.047E-03	1.258E-02	1.062E-03	3.422E-02	2.190E-01	2.112E-01	9.673E-02
3	3.025E-03	1.310E-02	1.072E-03	3.565E-02	2.179E-01	2.112E-01	9.367E-02
STA	L/U	DELTA E	LE				
1	1.101E-01	2.957E-01	3.500E-00				
2	1.057E-01	2.957E-01	3.500E-00				
3	2.044E-01	2.957E-01	3.500E-00				

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LOCAL TEST PARAMETERS

Test 110 CURRENT CALC. CUMNUT AFTER DATA POINT 0

DATA POINT 0									
STA	VL	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	U/AP	M
1	2.012E-03	1.021E-02	1.0397E-02	4.0572E-02	3.0129E-01	3.0033E-01	9.007E-02	3.34E-02	1.023E-02
2	2.012E-03	1.021E-02	1.0395E-02	4.0591E-02	3.0130E-01	3.0033E-01	1.0497E-01	2.764E-02	1.030E-02
3	2.012E-03	1.021E-02	1.0395E-02	4.0597E-02	3.0130E-01	3.0033E-01	1.0722E-01	2.831E-02	1.037E-02

LOCAL TEST PARAMETERS

Test 110 CURRENT CALC. CUMNUT AFTER DATA POINT 6

DATA POINT 6									
STA	VL	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	U/AP	M
1	2.012E-03	1.021E-02	1.0470E-02	4.0607E-02	3.0432E-01	3.0304E-01	9.056E-02	3.352E-02	1.035E-02
2	2.012E-03	1.021E-02	1.0455E-02	4.0236E-02	3.0433E-01	3.0304E-01	1.0131E-01	2.921E-02	1.046E-02
3	2.012E-03	1.021E-02	1.0470E-02	4.0515E-02	3.0432E-01	3.0304E-01	1.086E-01	3.042E-02	1.074E-02

LOCAL TEST PARAMETERS

Test 110 CURRENT CALC. CUMNUT AFTER DATA POINT 8

DATA POINT 8									
STA	VL	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	U/AP	M
1	2.012E-03	1.021E-02	1.0522E-02	4.0712E-02	3.0594E-01	3.0460E-01	1.0035E-01	3.443E-02	1.047E-02
2	2.012E-03	1.021E-02	1.0505E-02	4.0435E-02	3.0594E-01	3.0460E-01	1.034E-01	3.059E-02	1.058E-02
3	2.012E-03	1.021E-02	1.0491E-02	4.0218E-02	3.0594E-01	3.0460E-01	1.073E-01	2.717E-02	1.063E-02

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LOCAL TEST PARAMETERS

TEST 110 CURRENT CALC JURNAL AFTER DATA POINT 6

DATA POINT 7									
STA	PB	TB	T ₀	T ₁	Q/A	G/AP	H	DEL	TP
1	2.993E-03	1.213E-02	1.025E-03	5.592E-02	3.79E-01	3.554E-01	0.343E-02	0.259E-02	1.652E-02
2	6.953E-03	1.404E-02	1.564E-03	4.673E-02	2.798E-01	3.523E-01	1.007E-01	1.271E-02	1.698E-02
3	2.913E-03	1.526E-02	1.940E-03	4.951E-02	3.797E-01	3.584E-01	1.173E-01	2.003E-02	1.645E-02

LOCAL TEST PARAMETERS

TEST 110 CURRENT CALC BURNOUT AFTER DATA POINT 8

DATA POINT 8									
STA	PB	TB	T ₀	T ₁	Q/A	G/AP	H	DEL	TP
1	2.980E-03	1.300E-02	1.710E-03	6.303E-02	3.942E-01	3.792E-01	7.579E-02	5.663E-02	1.649E-02
2	2.939E-03	1.429E-02	1.630E-03	5.103E-02	3.930E-01	3.792E-01	1.032E-01	3.674E-02	1.658E-02
3	2.859E-03	1.557E-02	1.615E-03	4.872E-02	3.931E-01	3.792E-01	1.164E-01	3.315E-02	1.644E-02

DIMENSIONLESS PARAMETERS

TEST 110 CURRENT CALC BURNOUT AFTER DATA POINT 8

DATA PCINT	STA	MU	PR	RE	T1/TB	MU(PR(=1))
1	1	3.1432E-03	3.9635E-00	3.1775E-05	1.0733E-00	6.5770E-02
1	2	1.1515E-03	3.9347E-00	3.2106E-05	1.0729E-00	6.5574E-02
1	3	1.1349E-03	3.8802E-00	3.2484E-05	1.0731E-00	6.5570E-02
2	1	1.3682E-03	3.8254E-00	3.2710E-05	1.0244E-00	7.9938E-02
2	2	1.4261E-03	3.7072E-00	3.3591E-05	1.0231E-00	8.5432E-02
2	3	1.5167E-03	3.5919E-00	3.4482E-05	1.2477E-00	7.6850E-02
3	1	1.7469E-03	3.5934E-00	3.4467E-05	1.3996E-00	1.0492E-02
3	2	1.6241E-03	3.3452E-02	3.5242E-05	1.3740E-00	1.1122E-02
3	3	1.7445E-03	3.2029E-00	3.7957E-05	1.3813E-00	1.6951E-03
4	1	1.7096E-03	2.4183E-00	3.4889E-05	1.0574E-00	1.9694E-03
4	2	2.0390E-03	3.1644E-00	3.7200E-05	1.6163E-00	1.2548E-03
4	3	1.9627E-03	2.9513E-00	3.9388E-05	1.6669E-00	1.2739E-03
5	1	1.3544E-03	3.3393E-00	3.6299E-05	1.5724E-00	1.1424E-03
5	2	2.0654E-03	3.0787E-00	3.6822E-05	1.6489E-00	1.3328E-03
5	3	1.9761E-03	2.6593E-00	4.1246E-05	1.5869E-00	1.6930E-03
6	1	1.2629E-03	3.3031E-00	3.6358E-05	1.5869E-00	1.1679E-03
6	2	2.0696E-03	3.0362E-00	3.6976E-05	1.5582E-00	1.3801E-03
6	3	2.3691E-03	2.8111E-00	4.1514E-05	1.4454E-00	1.5265E-03
7	1	1.5600E-03	3.2669E-00	3.6766E-05	1.7240E-00	9.7134E-02
7	2	1.9442E-03	2.3946E-00	3.9500E-05	1.5447E-00	1.2829E-03
7	3	2.1225E-03	2.7654E-00	4.2184E-05	1.6933E-00	1.4130E-03
8	1	1.4134E-03	3.2271E-00	3.7084E-05	1.8448E-00	6.8674E-03
8	2	1.6894E-03	2.9474E-00	3.9932E-05	1.6093E-00	1.2263E-03
8	3	2.0563E-03	2.7055E-00	4.2807E-05	1.5338E-00	1.3817E-03

DATA POINT	STA	MU/HAT10	K/HAT10	MU	RATIO	CP RATIO
1	1	1.0117E-00	9.4073E-01	1.3035E-00	9.9757E-01	9.9964E-01
1	2	1.0117E-00	9.4143E-01	1.2977E-00	9.9864E-01	1.0005E-00
1	3	1.0117E-00	9.4102E-01	1.2975E-00	9.9859E-01	9.9359E-01
1	4	1.0620E-00	8.6273E-01	2.0889E-00	1.4547E-00	1.49342E-01
1	5	1.0510E-00	8.6803E-01	1.9570E-00	9.9703E-01	9.9703E-01
2	1	1.0047E-00	8.0857E-01	2.0509E-00	9.9739E-01	9.9964E-01
2	2	1.0047E-00	8.0226E-01	2.3569E-00	9.9739E-01	9.9739E-01
2	3	1.0102E-00	8.0162E-01	2.6644E-00	9.9739E-01	1.00215E-00
3	1	1.0102E-00	8.0162E-01	2.7044E-00	1.0006E-00	1.0006E-00
3	2	1.0170E-00	8.0612E-01	3.0121E-00	1.0193E-00	1.0193E-00
3	3	1.0169E-00	8.0590E-01	3.3321E-00	1.0193E-00	1.0193E-00
4	1	1.0170E-00	8.0613E-01	3.4351E-00	1.0247E-00	1.0247E-00
4	2	1.0170E-00	8.0593E-01	3.6233E-00	1.0137E-00	1.0137E-00
4	3	1.0170E-00	8.0593E-01	3.6233E-00	1.0137E-00	1.0137E-00
5	1	1.0170E-00	8.0512E-01	3.7231E-00	1.0118E-00	1.0118E-00
5	2	1.0170E-00	8.0512E-01	3.7231E-00	1.0118E-00	1.0118E-00
5	3	1.0170E-00	8.0512E-01	3.7231E-00	1.0118E-00	1.0118E-00
6	1	1.0170E-00	8.0512E-01	3.7231E-00	1.0118E-00	1.0118E-00
6	2	1.0170E-00	8.0512E-01	3.7231E-00	1.0118E-00	1.0118E-00
6	3	1.0170E-00	8.0512E-01	3.7231E-00	1.0118E-00	1.0118E-00

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DIMENSIONLESS PARAMETERS

TEST 110 CURRENT CALC IURRENT AFTER DATA POINT 8

DATA POINT	STA	MU(P)	P(M/P)	RECP	T(L/T)	MU(P)
1	1	1.1081E 03	3.3600E 00	3.6336E 05	1.0394E 00	6.0239E 02
1	2	1.1163E 03	3.3260E 00	3.6649E 05	1.0395E 00	6.0237E 02
1	3	1.1090E 03	3.2762E 00	3.7104E 05	1.0383E 00	6.0235E 02
1	4	1.2437E 03	3.3287E 00	4.8045E 05	1.1699E 05	6.02391E 02
2	1	1.5030E 03	2.3590E 00	4.8282E 05	1.1624E 05	5.3975E 02
2	2	1.5030E 03	2.3590E 00	4.8282E 05	1.1624E 05	5.3975E 02
2	3	1.1937E 03	2.1943E 00	5.0515E 05	1.1192E 00	6.7549E 02
2	4	1.5493E 03	1.7566E 00	6.0260E 05	1.1642E 00	1.2237E 03
2	5	1.6168E 03	1.7433E 00	6.0907E 05	1.1573E 00	1.2039E 03
2	6	1.5567E 03	1.6613E 00	6.3448E 05	1.1692E 00	1.2732E 03
2	7	1.4632E 03	1.3790E 00	7.1734E 05	1.2231E 00	1.3944E 03
2	8	1.3059E 03	1.4522E 00	6.7628E 05	1.1891E 00	1.6214E 03
2	9	1.7560E 03	1.4071E 00	7.1119E 05	1.1902E 00	1.6317E 03
2	10	1.6109E 03	1.3594E 00	7.4401E 05	1.2223E 00	1.4247E 03
2	11	1.6539E 03	1.6165E 00	7.1968E 05	1.1907E 00	1.6125E 03
2	12	1.7729E 03	1.2177E 00	7.6763E 05	1.2602E 00	1.3930E 03
2	13	1.6401E 03	1.3244E 00	7.5281E 05	1.2203E 00	1.4649E 03
2	14	1.8549E 03	1.3690E 00	7.3616E 05	1.2021E 00	1.6239E 03
2	15	2.0851E 03	1.3961E 00	7.2745E 05	1.1822E 00	1.8244E 03
2	16	1.3532E 03	1.1253E 00	6.7084E 05	1.2658E 00	1.2900E 03
2	17	1.7711E 03	1.25982E 00	7.7347E 05	1.2141E 20	1.5973E 03
2	18	1.3150E 03	1.2979E 00	7.7773E 05	1.1900E 00	1.7230E 03
2	19	1.2305E 03	9.6683E-01	9.7791E 05	1.2976E 00	1.2304E 03
2	20	1.6758E 03	1.1666E 00	8.3482E 05	1.2334E 00	1.6344E 03
2	21	1.35589E 03	1.26931E 00	8.2592E 05	1.2121E 00	1.7230E 03

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

TEST 112 BURNOUT AT DATA POINT 7

$AF = 0.264E-03$ $D = 0.163E-01$ $L = 0.450E-01$ $\Delta T_D = 0.900E-00$

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	F2	I2	QP	MT BAL	G
1	4.535E-03	3.943E-03	1.089E-02	1.181E-02	1.100E-00	9.010E-00	4.638E-02	3.952E-02	-4.742E-01	4.167E-03
2	4.935E-03	4.094E-03	1.094E-02	1.311E-02	1.095E-00	1.522E-01	7.730E-02	1.115E-01	-3.204E-01	4.148E-03
3	4.935E-03	4.065E-03	1.065E-02	1.437E-02	1.097E-00	2.036E-01	1.029E-01	1.969E-01	-2.254E-01	4.155E-03
4	3.673E-03	3.958E-03	1.085E-02	1.571E-02	1.110E-00	2.436E-01	1.209E-01	2.792E-03	-2.174E-01	4.205E-03
5	3.670E-03	3.955E-03	1.065E-02	1.649E-02	1.090E-00	2.630E-01	1.372E-01	3.246E-03	-1.972E-01	4.129E-03
6	3.659E-03	3.950E-03	1.099E-02	1.762E-02	1.085E-00	2.809E-01	1.385E-01	3.668E-03	-2.568E-01	4.110E-03
7	3.655E-03	3.945E-03	1.094E-02	1.757E-02	1.052E-00	2.425E-01	1.400E-01	3.749E-01	-2.399E-01	4.098E-03

TEST SECTION

LUCAN TEST PARAMETERS

TEST 112 BURNOUT AT DATA POINT 7

DATA POINT 1

STA	LE	TE	T ₁	T ₂	J/A	J/AP	H	DEL TF	V _S
1	1.024E-03	1.015E-03	1.340E-02	1.711E-02	1.209E-00	1.297E-00	2.009E-02	5.457E-01	4.737E-01
2	1.047E-03	1.015E-03	1.140E-02	1.212E-02	1.271E-00	1.247E-00	1.114E-02	4.161E-01	4.743E-01
3	1.094E-03	1.017E-03	2.010E-02	2.170E-02	5.382E-01	8.403E-01	9.639E-03	2.238E-01	4.748E-01

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LOCAL TEST PARAMETERS

TEST 112 OUTPUT AT DATA POINT 7

STA	ν_0	r_L	T_0	T_{∞}	DATA POINT 2		Q/A	Q/AP	H	DEL. TF	VS
					T _g	T _l					
1	2.045E-03	0.3	1.021E-02	4.019E-02	2.075E-02	3.055E-02	3.055E-02	3.041E-02	2.033E-02	1.055E-02	4.731E-01
2	2.045E-03	0.3	1.021E-02	3.097E-02	2.022E-02	3.056E-02	3.041E-02	3.041E-02	2.0854E-02	1.027E-02	4.741E-01
3	2.045E-03	0.3	1.021E-02	4.095E-02	2.073E-02	3.043E-02	3.053E-02	3.045E-02	2.0431E-02	1.0453E-02	4.751E-01

LOCAL TEST PARAMETERS

TEST 112 OUTPUT AT DATA POINT 7

STA	ν_0	r_L	T_0	T_{∞}	DATA POINT 3		Q/A	Q/AP	H	DEL. TF	VS
					T _g	T _l					
1	2.045E-03	0.3	1.021E-02	6.050E-02	3.074E-02	6.028E-02	6.028E-02	6.023E-02	2.0594E-02	2.0383E-02	0.0373E-01
2	2.045E-03	0.3	1.021E-02	5.045E-02	3.051E-02	6.028E-02	6.042E-02	6.042E-02	2.0951E-02	2.0175E-02	4.767E-01
3	2.045E-03	0.3	1.021E-02	5.050E-02	4.040E-02	5.046E-02	5.026E-02	5.026E-02	2.0598E-02	3.0455E-02	4.783E-01

LOCAL TEST PARAMETERS

TEST 112 OUTPUT AT DATA POINT 7

STA	ν_0	r_L	T_0	T_{∞}	DATA POINT 4		Q/A	Q/AP	H	DEL. TF	VS
					T _g	T _l					
1	2.045E-03	0.3	1.021E-02	7.044E-02	4.033E-02	8.089E-02	8.094E-02	8.094E-02	3.0024E-02	2.0005E-02	4.822E-01
2	2.045E-03	0.3	1.021E-02	7.030E-02	4.016E-02	8.050E-02	8.094E-02	8.094E-02	3.0322E-02	2.0731E-02	4.844E-01
3	2.045E-03	0.3	1.021E-02	7.030E-02	4.030E-02	8.042E-02	8.064E-02	8.064E-02	2.0355E-02	3.0760E-02	4.866E-01

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LOCAL TEST PARAMETERS

TEST 112 BURNOUT AT DATA POINT 7

STA	μ_B	T_B	T_w	T_1	Q/A	Q/AP	H	DEL TF	VS	DATA POINT
1	3.963E-03	1.047E-02	8.030E-02	4.461E-02	1.049E-01	1.061E-01	3.026E-02	3.094E-12	4.743E-01	1
2	2.956E-03	1.492E-02	7.840E-02	4.231E-02	1.041E-01	1.061E-01	3.873E-02	2.738E-02	4.738E-01	2
2	2.930E-03	1.614E-02	8.780E-02	5.509E-02	9.652E-03	1.024E-01	2.565E-02	3.991E-01	4.794E-01	3
STA	L/D	DELTA L	LE							
1	1.623E-01	1.088E-01	2.000E-00							
2	1.478E-01	1.088E-01	2.000E-00							
3	1.533E-01	4.300E-00	7.500E-01							

LOCAL TEST PARAMETERS

TEST 112 BURNOUT AT DATA POINT 7

STA	μ_B	T_B	T_w	T_1	Q/A	Q/AP	H	DEL TF	VS	DATA POINT
1	3.955E-03	1.423E-02	8.900E-02	4.990E-02	1.178E-01	1.201E-01	3.262E-02	3.573E-02	4.733E-01	1
2	2.956E-03	1.575E-02	8.760E-02	4.381E-02	1.173E-01	1.201E-01	3.693E-02	3.253E-02	4.763E-01	2
3	2.930E-03	1.723E-02	8.800E-02	6.499E-02	1.114E-01	1.173E-01	2.580E-02	4.544E-02	4.794E-01	3
STA	L/D	DELTA L	LE							
1	1.622E-01	1.223E-01	2.000E-00							
2	1.479E-01	1.223E-01	2.000E-00							
3	1.533E-01	4.633E-00	7.500E-01							

LOCAL TEST PARAMETERS

TEST 112 BURNOUT AT DATA POINT 7

STA	μ_B	T_B	T_w	T_1	Q/A	Q/AP	H	DEL TF	VS	DATA POINT
1	1.972E-03	1.042E-02	5.000E-02	5.071E-02	1.046E-01	1.021E-01	1.021E-02	1.034AF-02	4.720E-01	1
2	2.959E-03	1.539E-02	6.820E-02	6.073E-02	1.041E-01	1.021E-01	1.021E-02	1.027AF-02	4.750E-01	2
3	2.726E-03	1.724E-02	6.650E-02	6.011E-02	1.040E-01	1.020E-01	1.020E-02	1.033AF-02	4.781E-01	3
STA	L/D	DELTA L	LE							
1	1.024E-01	1.227E-01	2.000E-00							
2	1.477E-01	1.227E-01	2.000E-00							
3	1.533E-01	4.703E-00	7.500E-01							

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KALIKA RAI AND S. K. SINGH

1	1.0e-7, E	0C	6e-1.073E-01	1.4555E-30	9e-7651E-01
2	1.0J17.3t	00	5e-0.923E-01	1.2042E-30	9e-7757E-01
3	1.0J457.	0C	5e-0.942E-01	1.63dE-30	9e-7731E-01
4	1.0J712L	00	6e-0.973E-01	2.0983L-30	9e-887E-01
5	1.0J757L	00	6e-0.920E-01	1.0530E-30	9e-6831E-01
6	1.0J895E	0C	6e-0.950E-01	2.0320E-30	9e-7176E-01
7	1.0J935E	47	6e-0.908E-01	2.9852E-30	9e-7365E-01
8	1.0J935E	0C	6e-0.943E-01	2.5421E-30	9e-6935C-01
9	1.0J943E	0C	6e-0.972E-01	3.3e-3E-30	9e-9240E-01
10	1.0J971E	00	6e-0.923E-01	3.3e-27E-30	9e-8886E-01
11	1.0J971E	30	6e-0.957E-01	2.99dE-30	9e-8157E-01
12	1.0e-0.957	0C	4e-0.912E-01	3.0233E-30	1.e-0.201E-30
13	1.0e-0.957	00	2e-0.907E-01	3.4195E-30	9e-9268E-01
14	1.0J311E	0L	2e-0.968E-01	2.5675F-30	9e-3285E-01
15	1.0e-0.9act	09	9e-0.9203E-01	4e-0.53dE-30	1.e-0.285F-00
16	1.0e-0.931E	09	9e-1.093E-01	3.6717L-30	1.e-109E-30
17	1.0e-0.935E	00	9e-1.073E-01	3e-40.54E-30	1.e-30.37E-30
18	1.0e-0.959E	30	1.e-0.9642E	3.0	1.e-0.401E-00
19	1.0e-0.954E	00	7e-0.92311E-01	4e-34.07E-30	1.e-0.322E-00
20	1.0J711E	0C	7e-0.9143E-01	5.4296L-30	1.e-20.5E-00
21	1.0e-0.924E	60	1.e-0.9230E-01	1.0	1.e-0.23H3E-00

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DIMENSIONLESS PARAMETERS

TEST 112 BURNOUT AT DATA POINT 7

DATA POINT	STA	NU(F)	PR(F)	RE(F)	T/L/T ^F	NU/PR(1.4)
1	1	5.0660E 02	2.8886E 00	1.6031E 05	1.0533E 00	3.3143E 02
1	2	7.9673E 02	3.0804E 00	1.5282E 05	1.0349E 00	5.0180E 02
1	3	2.3730E 02	2.5672E 00	1.7556E 05	1.0740E 00	1.6227E 02
2	1	5.5465E 02	2.1020E 00	2.0429E 05	1.1183E 00	4.1207E 02
2	2	6.8205E 02	2.2081E 00	1.9705E 05	1.0983E 00	4.9756E 02
2	3	3.3201E 02	1.6396E 00	2.5014E 05	1.1709E 00	2.7341E 02
2	4	2.9274E 02	1.6437E 00	2.4901E 05	1.1749E 00	4.8529E 02
3	1	6.7937E 02	1.7035E 00	2.4323E 05	1.1548E 00	5.4900E 02
3	2	4.0492E 02	1.3806E 00	2.9128E 05	1.2019E 00	4.6865E 02
3	3	6.0522E 02	1.4415E 00	2.8292E 05	1.2023E 00	5.9190E 02
3	4	7.5458E 02	1.4582E 00	2.6143E 05	1.1646E 00	6.4889E 02
3	5	5.2867E 02	1.1491E 00	3.4715E 05	1.2343E 00	5.0007E 02
3	6	7.7513E 02	1.3951E 00	2.8622E 05	1.2059E 00	6.7847E 02
3	7	8.7655E 02	1.4244E 00	2.8264E 05	1.1835E 00	7.6123E 02
3	8	2.7516E 02	1.0792E 00	3.6154E 05	1.2429E 00	5.5790E 02
6	1	7.5t43E 02	1.2408E 00	3.1600E 05	1.2287E 00	6.9297E 02
6	2	6.2963E 02	1.2456E 00	3.1696E 05	1.2083E 00	7.0004E 02
6	3	5.8066E 02	9.6429E-01	4.0341E 05	1.2643E 00	5.8917E 02
7	1	7.5249E 02	1.1694E 00	3.2813E 05	1.2321E 00	7.0206E 02
7	2	d.3761E 02	1.2070E 00	3.2600E 05	1.2094E 00	7.7777E 02
7	3	6.0364E 02	9.7152E-01	3.9919E 05	1.2615E 00	6.1066E 02

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

TEST 113 DATA POINT 13 IS BURNOUT

$A_F = 0.254E-03$ $D = 0.183E-01$ $L = 0.500E 01$ $\Delta T_{TO} = 0.200E-01$

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	E	E2	12	OP	AT. BSL.	S
1	3.984E 03	3.979E 03	6.170E 01	5.790E-01	1.023E 01	4.716E 02	4.574E 00	2.056E 00	2.163E 03	
2	3.990E 03	3.975E 03	6.175E 01	5.790E-01	1.024E 01	4.662E 02	4.395E-01	2.056E 00	2.163E 03	
3	4.008E 03	4.001E 03	6.190E 01	5.840E-01	1.043E 01	6.348E 02	6.092E 00	-1.629E 01	2.212E 03	
4	4.032E 03	3.999E 03	6.200E 01	5.830E-01	1.062E 01	7.363E 02	1.138E 01	-1.544E 01	2.206E 03	
5	4.039E 03	4.035E 03	6.200E 01	5.810E-01	1.072E 01	7.795E 02	1.272E 01	-2.038E 01	2.216E 03	
6	4.032E 03	4.028E 03	6.213E 01	5.850E-01	1.083E 01	6.293E 02	1.643E 01	-2.348E 01	2.216E 03	
7	4.030E 03	4.026E 03	6.220E 01	5.850E-01	1.095E 01	6.801E 02	1.627E 01	-2.938E 00	2.216E 03	
8	4.029E 03	4.024E 03	6.222E 01	5.850E-01	1.123E 02	5.650E-01	1.794E 01	-3.588E 00	2.216E 03	
9	4.028E 03	4.024E 03	6.220E 01	5.850E-01	1.171E 02	5.050E-01	2.136E 01	9.625E 02	4.549E 00	2.216E 03
10	4.028E 03	4.022E 03	6.230E 01	1.243E 02	5.800E-01	2.263E 01	1.015E 03	2.178E 01	5.976E 00	2.226E 03
11	4.027E 03	4.022E 03	6.230E 01	1.303E 02	5.850E-01	1.053E 03	2.344E 01	7.408E 01	2.216E 03	
12	4.027E 03	4.022E 03	6.246E 01	1.400E 02	5.810E-01	2.463E 01	1.101E 03	2.571E 01	1.163E 01	2.201E 03
13	4.030E 03	4.022L 03	6.230E 01	1.483E 02	5.790E-01	2.533E 01	1.130E 03	2.713E 01	1.652E 01	2.193E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST 1.3 DATA POINT 1.3 IS BURNOUT

DATA POINT 1

STA	L/D	LE	T _B	T _a	W/A	Q/AP	H	DEL TF	V _S
1	3.561E 03	6.052E 01	2.200E 02	1.704E 02	1.301E 00	1.335E 00	1.311E-02	1.019E 02	2.448E 01
2	3.600L 03	7.100E 01	2.280E 02	1.734E 02	1.301E 00	1.335E 00	1.344E-02	9.939E 01	2.451E 01
3	3.679E 03	7.348E 01	2.480E 02	1.689E 02	1.352E 00	1.362E 00	1.180E-02	1.159E 02	2.453E 01

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LOCAL TEST PARAMETERS

TEST 113 DATA POINT 13 IS BURNOUT

DATA POINT 2									
STA	P _D	T _D	T _E	T _S	T _I	Q/A	Q/AP	H	DEL TF
1	2.977E-03	7.173E-01	2.669E-02	2.191E-02	1.687E-03	1.933E-00	1.933E-00	1.312E-02	1.474E-02
2	2.976E-03	7.536E-01	2.390E-02	2.121E-02	1.683E-03	1.933E-00	1.933E-00	1.345E-02	1.436E-02
3	2.975E-03	7.859E-01	2.260E-02	2.441E-02	1.967E-03	1.977E-00	1.977E-00	1.198E-02	1.651E-02

DATA POINT 3									
STA	L/C	DELTA L	LE	T _D	T _I	Q/A	Q/AP	H	DEL TF
1	1.0551E-01	4.580E-01	2.000E-00	5.780E-01	2.000E-00	2.595E-00	2.595E-00	1.281E-02	2.026E-02
2	1.0766E-01	4.980E-01	2.000E-00	5.780E-01	2.000E-00	2.595E-00	2.595E-00	1.320E-02	1.966E-02
3	1.0101E-01	1.610E-01	7.500E-01	7.500E-01	2.000E-00	2.595E-00	2.595E-00	1.220E-02	2.179E-02

LOCAL TEST PARAMETERS

TEST 113 DATA POINT 13 IS BURNOUT

DATA POINT 4									
STA	P _D	T _D	T _E	T _S	T _I	Q/A	Q/AP	H	DEL TF
1	4.0304E-03	7.3237E-01	3.800E-02	2.760E-02	2.032E-02	2.595E-00	2.595E-00	1.281E-02	2.476E-01
2	4.0303E-03	4.227E-01	3.750E-02	2.709E-02	2.032E-02	2.595E-00	2.595E-00	1.320E-02	1.966E-02
3	4.0301E-03	4.547E-01	3.640E-02	2.653E-02	2.032E-02	2.595E-00	2.595E-00	1.220E-02	2.486E-01

LOCAL TEST PARAMETERS

TEST 113 DATA POINT 13 IS BURNOUT

DATA POINT 5									
STA	L/C	DELTA L	LE	T _D	T _I	Q/A	Q/AP	H	DEL TF
1	1.0251E-01	9.860E-01	2.000E-00	3.229E-02	3.032E-02	3.032E-00	3.032E-00	1.363E-02	2.436E-02
2	1.0700E-01	5.780E-01	2.000E-00	3.105E-02	3.023E-02	3.023E-00	3.023E-00	1.423E-02	2.339E-02
3	1.0101E-01	2.220E-01	7.500E-01	3.059E-02	3.058E-02	3.058E-00	3.058E-00	1.274E-02	2.671E-02

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LOCAL TEST PARAMETERS

TEST 113 DATA POINT 1 IS BURNOUT

STA	P_B	T_E	T_B	T_A	DATA POINT 1		J/A_P	H	DEL T_F	V_S
					J/A	J/A_D				
1	4.037E-03	8.130E-01	4.840E-02	3.504E-02	3.605E-03	3.704E-03	3.704E-00	1.376E-02	2.691E-02	2.697E-01
2	4.036E-03	8.032E-01	4.840E-02	3.410E-02	3.606E-02	3.704E-02	3.704E-00	1.402E-02	2.533E-02	2.694E-01
3	4.035E-03	8.034E-01	5.250E-02	3.630E-02	3.750E-02	3.805E-02	3.805E-00	1.323E-02	2.876E-02	2.501E-01

LOCAL TEST PARAMETERS

TEST 113 DATA POINT 1 IS SURGE

STA	P_B	T_E	T_B	T_A	DATA POINT 1		J/A_P	H	DEL T_F	V_S
					J/A	J/A_D				
1	4.030E-03	6.401E-01	5.200E-02	3.600E-02	4.031E-02	4.031E-00	4.031E-00	1.020E-02	2.019E-02	2.039E-01
2	4.029E-03	5.620E-01	5.150E-02	3.613E-02	4.032E-02	4.032E-00	4.032E-00	1.059E-02	2.095E-02	2.492E-01
3	4.028E-03	5.620E-01	5.660E-02	4.035E-02	4.035E-02	4.035E-00	4.035E-00	1.395E-02	3.086E-02	2.506E-01

LOCAL TEST PARAMETERS

TEST 113 DATA POINT 1 IS SURGE

STA	P_B	T_E	T_B	T_A	DATA POINT 1		J/A_P	H	DEL T_F	V_S
					J/A	J/A_D				
1	4.023E-03	4.700E-01	5.000E-02	3.600E-02	4.003E-02	4.003E-00	4.003E-00	1.521E-02	3.113E-02	2.493E-01
2	4.027E-03	5.000E-01	5.050E-02	3.730E-02	4.005E-02	4.005E-00	4.005E-00	1.711E-02	2.769E-02	2.522E-01
3	4.022E-03	5.050E-01	5.240E-02	4.502E-02	4.007E-02	4.007E-00	4.007E-00	1.413E-02	3.450E-02	2.512E-01

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LOCAL TEST PARAMETERS

STA	P/E	T _E	T _G	DATA POINT 8				DEL. TF	VS
				T _I	Q/A	Q/AP	H		
1	4.0 JET 0.1	5.0 27.0	C1	5.0 20.0	5.0 07.0E 0.0	5.0 22.3E 0.0	1.0 66.0E-0.2	3.0 147E 0.2	2.0 495E 0.1
2	4.0 JET 0.3	5.0 37.0	C1	5.0 5.0E 0.2	5.0 08.3E 0.0	5.0 22.3E 0.0	1.0 85.8E-0.2	2.0 81.2E 0.2	2.0 506E 0.1
3	4.0 JET 0.3	5.0 53.0	C1	5.0 5.0E 0.2	5.0 00.0E 0.0	5.0 36.9E 0.0	1.0 53.0E-0.2	3.0 50.8E 0.2	2.0 517E 0.1

TEST 111 DATA POINT 13 IS SURGEUT

LOCAL TEST PARAMETERS

STA	P/E	T _E	T _G	DATA POINT 9				DEL. TF	VS
				T _I	Q/A	Q/AP	H		
1	4.0 JET 0.3	5.0 24.0	C1	5.0 21.0E 0.2	5.0 2.0E 0.2	5.0 67.0E 0.0	1.0 72.0E-0	3.0 30.0E 0.2	2.0 49.0E 0.1
2	4.0 JET 0.3	5.0 34.0	C1	5.0 4.9E 0.2	5.0 7.6E 0.2	5.0 51.5E 0.0	3.0 6.70E 0.0	2.0 9.43E 0.2	2.0 51.0E 0.1
3	4.0 JET 0.3	5.0 44.0	C1	5.0 1.4E 0.2	5.0 7.9E 0.2	5.0 78.1E 0.0	5.0 22.5E 0.0	1.0 59.4E-0.2	3.0 65.4E 0.2

TEST 111 DATA POINT 13 IS SURGEUT

LOCAL TEST PARAMETERS

STA	P/E	T _E	T _G	DATA POINT 10				DEL. TF	VS
				T _I	Q/A	Q/AP	H		
1	4.0 JET 0.1	5.0 64.0	C1	5.0 52.0E 0.2	5.0 31.4E 0.2	5.0 18.3E 0.0	6.0 34.7E 0.0	1.0 89.5E-0.2	3.0 35.0E 0.2
2	4.0 JET 0.3	5.0 83.0	C2	5.0 31.0E 0.2	5.0 07.5E 0.2	5.0 19.1E 0.0	6.0 34.7E 0.0	2.0 12.5E-0.2	2.0 9.0E 0.2
3	4.0 JET 0.3	5.0 12.0	C2	5.0 23.3E 0.2	5.0 07.0E 0.2	5.0 44.8E 0.0	6.0 49.6E 0.0	1.0 71.2E-0.2	3.0 79.5E 0.2

TEST 111 DATA POINT 13 IS SURGEUT

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LOCAL TEST PARAMETERS

TEST 113 DATA POINT 13 IS BURNOUT

DATA POINT 11									
STA	ρ_B	ρ_A	T _B	T _A	Q/A	Q/AP	H	DEL TF	V _S
1	4.024E-03	6.034E-01	0.720E-02	4.304E-02	0.6430E-00	0.630E-00	2.028E-02	3.368E-02	2.500E-01
2	4.024E-03	6.034E-01	0.502E-02	4.109E-02	0.652E-00	0.6430E-00	2.049E-02	3.038E-02	2.520E-01
3	4.022E-03	6.026E-01	0.502E-02	5.198E-02	0.642E-00	0.6420E-00	1.767E-02	3.922E-02	2.534E-01

DATA POINT 12									
STA	ρ_B	ρ_A	T _B	T _A	Q/A	Q/AP	H	DEL TF	V _S
1	4.024E-03	1.053E-01	7.198E-02	4.629E-02	7.287E-00	7.489E-00	2.079E-02	3.603E-02	2.494E-01
2	4.023E-03	1.020E-01	6.993E-02	4.424E-02	7.293E-00	7.469E-00	2.327E-02	3.218E-02	2.511E-01
3	4.022E-03	1.036E-01	6.120E-02	5.556E-02	7.008E-00	7.711E-00	1.838E-02	4.195E-02	2.527E-01

LOCAL TEST PARAMETERS

TEST 113 DATA POINT 13 IS BURNOUT

DATA POINT 13									
STA	ρ_B	ρ_A	T _B	T _A	Q/A	Q/AP	H	DEL TF	V _S
1	4.026E-03	1.056E-01	7.590E-02	4.959E-02	7.686E-00	7.903E-00	2.046E-02	3.853E-02	2.490E-01
2	4.024E-03	1.026E-01	7.490E-02	4.844E-02	7.691E-00	7.903E-00	2.210E-02	3.576E-02	2.509E-01
3	4.022E-03	1.044E-01	8.580E-02	5.936E-02	8.070E-00	8.120E-00	1.805E-02	4.496E-02	2.527E-01

LOCAL TEST PARAMETERS

TEST 113 DATA POINT 13 IS BURNOUT

DATA POINT 14									
STA	ρ_B	ρ_A	T _B	T _A	Q/A	Q/AP	H	DEL TF	V _S
1	1.025E-01	1.020E-01	2.000E-00	2.000E-00	2.000E-00	2.000E-00	2.000E-00	3.853E-02	2.490E-01
2	1.020E-01	1.020E-01	2.000E-00	2.000E-00	2.000E-00	2.000E-00	2.000E-00	3.576E-02	2.509E-01
3	1.016E-01	3.930E-01	7.500E-01	7.500E-01	7.500E-01	7.500E-01	7.500E-01	4.496E-02	2.527E-01

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DIMENSIONLESS PARAMETERS

TABLE II - DATA POINT 13 IS CURRENT

LATA POINT	SIA	NU	PH	RE	T1/T8	NU/PRI(0)
1	1	3.7244E-32	5.0767E-04	4.7587E-04	1.1927E-00	1.8481E-02
1	2	3.0512E-02	3.5594E-01	4.3546E-04	1.0187E-00	1.9067E-02
1	3	3.0234E-02	3.0432E-00	3.0129E-04	1.2164E-00	1.6888E-02
1	4	3.0705E-02	5.0347E-02	4.9222E-04	1.2772E-00	1.8675E-02
1	5	3.0775E-02	5.0312E-02	5.1110E-04	1.2865E-00	1.9359E-02
1	6	3.0542E-02	5.0592E-02	5.3033E-04	1.3063E-00	1.7235E-02
1	7	3.0536E-02	5.0312E-02	5.1252E-04	1.3784E-00	1.8439E-02
1	8	3.0574E-02	5.0177E-02	5.4183E-04	1.3639E-00	1.9278E-02
1	9	3.0345E-02	4.7537E-02	5.6793E-04	1.3996E-00	1.8062E-02
1	10	3.0401E-02	5.0760E-02	5.3549E-04	1.4518E-00	1.9651E-02
1	11	3.0934E-02	4.7354E-02	5.0881E-04	1.4279E-00	2.1123E-02
1	12	3.0475E-02	4.4464E-02	6.0354E-04	1.4841E-00	1.9116E-02
1	13	3.0252E-02	4.9593E-02	5.0331E-04	1.4971E-00	2.0164E-02
1	14	3.0178E-02	4.0000E-02	5.0500E-04	1.4020E-00	2.1820E-02
1	15	3.0554E-02	4.2594E-02	6.1492E-04	1.5179E-00	2.0062E-02
1	16	3.0124E-02	4.0104E-02	5.6302E-04	1.5181E-00	2.2064E-02
1	17	3.0253E-02	4.0435E-02	6.0371E-04	1.4982E-00	2.3471E-02
1	18	3.0741E-02	4.1242E-02	7.4213E-04	1.5011E-00	2.0135E-02
1	19	3.0167E-02	4.0000E-02	5.7633E-04	1.4994E-00	2.2623E-02
1	20	3.0043E-02	4.2702E-02	6.2457E-04	1.4980E-00	2.5960E-02
1	21	3.0783E-02	3.9469E-02	6.6617E-04	1.6105E-00	2.1839E-02
1	22	3.0345E-02	4.0535E-02	5.4231E-04	1.5725E-00	2.0851E-02
1	23	3.00134F-02	4.0139E-02	6.0410E-04	1.5024E-00	2.0420E-02
1	24	3.00632E-02	3.0000E-02	6.3739E-04	1.40157E-00	2.3640E-02
1	25	3.00654E-02	3.0446E-02	5.0550E-04	1.5973E-00	2.5907E-02
1	26	3.01771E-02	4.0000E-02	6.0073E-04	1.6223E-00	2.3711E-02
1	27	3.0000E-02	3.0000E-02	7.0869E-04	1.6362E-00	2.5039E-02
1	28	3.01405E-02	4.2500E-02	6.2633E-04	1.6020E-00	2.8795E-02
1	29	3.0571E-02	3.0831E-02	6.3633E-04	1.5251E-00	3.3053E-02
1	30	3.0471E-02	3.0459E-02	7.4579E-04	1.6530E-00	2.7219E-02
1	31	3.04735E-02	4.01417L-02	6.0359E-04	1.6020E-00	3.1011E-02
1	32	3.00745E-02	3.0000E-02	7.3542E-04	1.5392E-00	3.5230E-02
1	33	3.01304E-02	3.03113E-02	7.7227E-04	1.6036E-00	2.8686E-02
1	34	3.00511E-02	3.00511E-02	6.6132E-04	1.6397E-00	3.2121E-02
1	35	3.00504E-02	3.04477E-02	7.3618E-04	1.5512E-00	3.6997E-02
1	36	3.00505E-02	3.0000E-02	6.1327E-04	1.7037E-00	2.9935E-02
1	37	3.0000E-02	3.0000E-02	6.0791E-04	1.6781E-00	3.1670E-02
1	38	3.00724E-02	3.0316E-02	6.0094E-04	1.5094E-00	3.5692E-02
1	39	3.00518E-02	3.00722E-02	6.0722E-04	1.7443E-00	2.9720E-02

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DIMENSIONLESS PARAMETERS

1.1.1 DATA POINTS IN THE MEDIUM

DATA POINT	STA	F(F)	P(F)	PR(F)	ME(F)	T/F	M/F(-)
1	1	1.04131	0.6	2.03105	0.0	7.1223E-06	2.0792E-02
2	2	1.05155	0.4	1.04743E	0.0	7.1933E-06	2.1359E-02
3	3	1.05175	0.2	1.01971E	0.0	7.5812E-06	1.9981E-02
4	4	1.05195	0.2	1.02271E	0.0	8.1217E-06	2.1627E-02
5	5	1.05215	0.2	1.02051E	0.0	8.5846E-06	2.2222E-02
6	6	1.05235	0.2	1.02254E	0.0	9.1594E-06	2.0162E-02
7	7	1.05255	0.2	1.00052E	0.0	9.9559E-06	1.3202E-02
8	8	1.05275	0.2	1.01645E	0.0	9.7570E-06	1.9911E-02
9	9	1.05295	0.2	1.04242E	0.0	1.02519E-06	2.2713E-02
10	10	1.05315	0.2	1.01490E	0.0	1.0554E-06	2.1395E-02
11	11	1.05335	0.2	1.02259E	0.0	1.0809E-05	1.8433E-02
12	12	1.05355	0.2	1.02715E	0.0	1.1043E-05	2.0161E-02
13	13	1.05375	0.2	1.00618E	0.0	1.0871E-05	1.7680E-02
14	14	1.05395	0.2	1.04911E	0.0	1.0222E-05	2.3106E-02
15	15	1.05415	0.2	1.03261E	0.0	1.0492E-05	2.0762E-02
16	16	1.05435	0.2	1.04936E	0.0	1.0776E-05	2.06277E-02
17	17	1.05455	0.2	1.03546E	0.0	1.02577E-05	2.4693E-02
18	18	1.05475	0.2	1.07422E	0.0	1.02547E-05	2.7119E-02
19	19	1.05495	0.2	1.06463E	0.0	1.0399E-05	1.62058E-02
20	20	1.05515	0.2	1.03142E	0.0	1.0217E-05	1.91949E-02
21	21	1.05535	0.2	1.05227E	0.0	1.04522E-05	1.9911E-02
22	22	1.05555	0.2	1.07049E	0.0	1.07035E-05	1.4176E-02
23	23	1.05575	0.2	1.07674E	0.0	1.02532E-05	1.02057E-02
24	24	1.05595	0.2	1.06745E	0.0	1.04509E-05	1.23339E-02
25	25	1.05615	0.2	1.06723E	0.0	1.02919E-05	1.2225E-02
26	26	1.05635	0.2	1.07223E	0.0	1.05667E-05	1.22008E-02
27	27	1.05655	0.2	1.04305E	0.0	1.04662E-05	1.22354E-02
28	28	1.05675	0.2	1.06016E	0.0	1.0405E-05	1.2300E-02
29	29	1.05695	0.2	1.06426E	0.0	1.03150E-05	1.2071E-02
30	30	1.05715	0.2	1.06431E	0.0	1.02414E-05	1.1703E-02
31	31	1.05735	0.2	1.05295E	0.0	1.0757E-05	1.2310E-02
32	32	1.05755	0.2	1.05906E	0.0	1.0359E-05	1.0037E-02
33	33	1.05775	0.2	1.02900E	0.0	1.02461E-05	1.2572E-02
34	34	1.05795	0.2	1.00331E	0.0	1.02130E-05	1.02346E-02
35	35	1.05815	0.2	1.06431E	0.0	1.02414E-05	1.1703E-02
36	36	1.05835	0.2	1.05215E	0.0	1.0757E-05	1.2310E-02
37	37	1.05855	0.2	1.05904E	0.0	1.0359E-05	1.0037E-02
38	38	1.05875	0.2	1.02900E	0.0	1.02461E-05	1.2572E-02
39	39	1.05895	0.2	1.00331E	0.0	1.02130E-05	1.02346E-02
40	40	1.05915	0.2	1.06431E	0.0	1.02414E-05	1.1703E-02
41	41	1.05935	0.2	1.05215E	0.0	1.0757E-05	1.2310E-02
42	42	1.05955	0.2	1.05904E	0.0	1.0359E-05	1.0037E-02
43	43	1.05975	0.2	1.02900E	0.0	1.02461E-05	1.2572E-02
44	44	1.05995	0.2	1.00331E	0.0	1.02130E-05	1.02346E-02
45	45	1.06015	0.2	1.06431E	0.0	1.02414E-05	1.1703E-02
46	46	1.06035	0.2	1.05215E	0.0	1.0757E-05	1.2310E-02
47	47	1.06055	0.2	1.05904E	0.0	1.0359E-05	1.0037E-02
48	48	1.06075	0.2	1.02900E	0.0	1.02461E-05	1.2572E-02
49	49	1.06095	0.2	1.00331E	0.0	1.02130E-05	1.02346E-02
50	50	1.06115	0.2	1.06431E	0.0	1.02414E-05	1.1703E-02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 114 3/16X0.5 TUBE WALL TEMP AGREEMENT=100F SWINGOUT AT DATA POINT 6

AF = 0.138E-01 D = 0.132E-01 L = 0.453E 01 DELTA TO = 0.200E 01

DATA POINTS

PCINT	TB-IN	P-J-OUT	TB-INT	TG-OUT	W	E2	E3	SP	SL SP	
1	2.913E 03	3.703E 03	6.730E 01	6.880E 01	1.920E 00	2.603E 01	9.083E 02	2.241E 01	-1.052E 02	
2	3.976E 03	3.713E 03	6.680E 01	6.003E 02	1.915E 00	3.394E 01	1.149E 03	3.642E 01	-2.728E 00	
3	2.970E 03	3.724E 03	6.080E 01	1.129E 02	1.910E 00	2.0	6.006E 01	1.362E 03	5.172E 01	-1.069E 02
4	3.890E 03	3.720E 03	6.080E 01	1.253E 02	1.902E 00	4.566E 01	1.556E 03	6.709E 01	-1.043E 02	
5	3.894E 03	3.710E 03	6.080E 01	1.353E 02	1.902E 00	4.910E 01	1.670E 03	7.773E 01	-2.653E 00	
6	3.893E 03	3.705E 03	6.080E 01	1.455E 02	1.903E 00	5.200E 01	1.775E 03	8.730E 01	-2.321E 00	

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TEST SECTION

TEST 114 S/16X4.5 TALL WALL TEMP AGREEMENT=100F SURGEAT AT DATA POINT 6

DATA POINT 1

STA	T _{in}	T _{out}	T _b	T _f	Q/A	J/AP	H	DEL TF	VS
1	2.018E-01	7.020E-01	5.016E-02	9.014E-01	1.040E-01	1.003E-01	7.049E-01	1.033E-01	1.056E-02
2	-0.703E-01	6.021E-01	4.002E-02	6.000E-01	1.031E-01	2.067E-01	-0.042E-01	-2.022E-01	1.056E-02
3	-0.711E-01	6.021E-01	5.029E-02	1.062E-01	1.052E-01	1.001E-01	1.042E-01	7.053E-01	1.056E-02
STA	L/E	G/A/T	L/E						
1	1.041E-01	2.000E-01	1.000E-00						
2	2.004E-01	5.013E-01	1.000E-00						
3	2.007E-01	5.003E-01	7.500E-01						

LOCAL TEST PARAMETERs

TEST 114 S/16X4.5 TALL WALL TEMP AGREEMENT=100F SURGEAT AT DATA POINT 6

DATA POINT 2

STA	T _{in}	T _{out}	T _b	T _f	Q/A	Q/AP	H	DEL TF	VS
1	2.014E-01	7.045E-01	5.039E-02	9.039E-01	1.053E-01	1.033E-01	1.036E-00	1.054E-01	1.056E-02
2	-0.707E-01	6.034E-01	4.030E-02	6.037E-01	1.069E-01	1.020E-01	2.017E-01	7.975E-01	1.056E-02
3	-0.714E-01	6.034E-01	5.060E-02	2.066E-01	1.059E-01	1.039E-01	1.025E-01	1.030E-02	1.057E-02
STA	L/E	G/A/T	L/E						
1	1.041E-01	2.043E-01	1.030E-00						
2	2.007E-01	5.010E-01	1.000E-00						
3	2.007E-01	5.003E-01	7.500E-01						

LOCAL TEST PARAMETERs

TEST 114 S/16X4.5 TALL WALL TEMP AGREEMENT=100F SURGEAT AT DATA POINT 6

DATA POINT 3

STA	T _{in}	T _{out}	T _b	T _f	Q/A	Q/AP	H	DEL TF	VS
1	1.041E-01	2.050E-01	5.049E-02	9.049E-01	1.052E-01	2.038E-01	1.097E-01	5.020E-01	1.056E-02
2	-0.707E-01	6.031E-01	4.030E-02	6.033E-01	1.069E-01	2.029E-01	1.075E-01	1.307E-02	1.056E-02
3	-0.714E-01	6.031E-01	5.060E-02	2.066E-01	1.059E-01	2.039E-01	1.025E-01	1.030E-02	1.057E-02
STA	L/E	G/A/T	L/E						
1	2.045E-01	5.000E-01	1.000E-00						
2	2.006E-01	5.000E-01	1.000E-00						
3	2.007E-01	5.003E-01	7.500E-01						

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LOCAL TEST PARAME TESTS

TEST 114 3/16R0.5 TUBE WALL TEMP AGREEMENT=100% SUBROUT AT DATA POINT 4

DATA POINT 4									
STA	PB	TB	TU	T1	Q/A	Q/AP	N	DEL. TP	V3
1	3.80E 03	9.630E 01	1.20E 03	1.48E 02	3.00E 01	3.01E 01	0.300E-01	7.16E 02	1.00E 02
2	3.79E 03	1.029E 02	1.23E 03	2.321E 02	3.89E 01	3.91E 01	0.320E-01	1.87E 02	1.00E 02
3	3.73E 03	1.025E 02	1.30E 03	3.32E 02	3.067E 01	3.06E 01	0.420E-01	2.10E 02	1.07E 02

LOCAL TEST PARAMETERS

TEST 114 3/16R0.5 TUBE WALL TEMP AGREEMENT=100% SUBROUT AT DATA POINT 5

DATA POINT 5									
STA	PB	TB	TU	T1	Q/A	Q/AP	N	DEL. TP	V3
1	3.80E 03	1.010E 02	1.35E 03	2.164E 02	3.83E 01	3.48E 01	0.623E-01	1.15E 02	1.00E 02
2	3.76E 03	1.163E 02	1.39E 03	3.171E 02	3.44E 01	3.43E 01	0.712E-01	2.00E 02	1.07E 02

LOCAL TEST PARAMETERS

TEST 114 3/16R0.5 TUBE WALL TEMP AGREEMENT=100% SUBROUT AT DATA POINT 6

DATA POINT 6									
STA	PB	TB	TU	T1	Q/A	Q/AP	N	DEL. TP	V3
1	3.79E 03	1.061E 02	1.47E 03	2.34E 02	3.95E 01	3.93E 01	0.59E-01	1.20E 02	1.00E 02
2	3.75E 03	1.236E 02	1.52E 03	3.54E 02	3.66E 01	3.67E 01	1.64E-01	2.35E 02	1.57E 02

STA	L/O	DELTA E	L
1	1.016E 01	1.167E 01	1.00E 02
2	2.04E 01	1.151E 01	1.00E 00

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DIMENSIONLESS PARAMETERS

TEST 114 3/16Kx0.5 TUBE WALL THICKNESS EMISSIVITY SHOOT AT DATA POINT 6

DATA POINT	STA	MU	PR	RE	T/L/R	W(L/T)(L,R)
1	1	1.5126E 00	5.1482E 00	2.6101E 05	1.0230E 00	7.8534E 00
1	2	-6.9013E 03	9.6875E 00	2.5264E 05	9.5995E -01	3.7231E 00
1	3	2.6682E 03	4.6394E 00	2.6490E 05	1.1374E 00	1.5944E 00
1	4	2.1209E 04	4.3375E 00	2.5375E 05	1.0230E 00	1.1230E 00
2	1	3.9893E 03	4.4680E 00	2.7198E 05	1.1447E 00	2.1894E 00
2	2	2.4488E 03	4.1817E 00	2.6749E 05	1.2339E 00	1.3817E 00
2	3	7.6785E 03	4.5231E 00	2.6377E 05	1.1664E 00	1.3600E 00
3	1	3.6147E 03	4.1216E 00	2.9028E 05	1.2323E 00	1.9277E 00
3	2	2.1801E 03	3.7894E 00	3.1189E 05	1.3560E 00	1.2004E 00
3	3	6.2463E 03	4.2623E 00	2.6934E 05	1.1289E 00	6.5174E 00
3	4	3.7390E 03	3.6912E 00	3.0862E 05	1.2666E 00	2.1859E 00
3	5	2.0923E 04	3.6219E 00	3.3797E 05	1.2699E 00	1.0441E 00
3	6	5.1843E 03	4.0387E 00	2.9193E 05	1.2693E 00	3.3504E 00
3	7	2.2568E 03	3.6605E 00	3.2394E 05	1.3405E 00	1.9599E 00
3	8	5.9919E 03	3.9162E 00	3.0104E 05	1.2277E 00	3.4220E 00
3	9	3.6597E 03	3.3994E 00	3.0021E 05	1.0431E 00	1.7923E 00

DATA POINT	STA	MU	K RATIO	MU RATIO	CP RATIO
1	1	1.0053E 00	5.7631E -01	1.1319E 00	1.0007E 00
1	2	-1.3992E -01	1.0395E 00	7.9385E -01	1.0009E 00
1	3	1.0324E 00	6.0546E -01	1.6317E 00	9.0008E -01
1	4	1.0363E 00	9.1753E -01	1.1374E 00	9.9007E -01
2	1	1.0369E 00	6.0217E -01	1.6534E 00	9.8430E -01
2	2	1.3582E 00	6.5753E -01	2.0397E 00	9.7793E -01
2	3	1.2250E 00	9.1602E -01	1.4763E 00	9.0009E -01
2	4	1.0563E 00	8.5881E -01	2.0267E 00	9.7657E -01
2	5	1.0591E 00	6.6467E -01	2.5107E 00	9.7163E -01
2	6	1.0359E 00	9.0261E -01	1.5012E 00	9.8273E -01
2	7	1.3693E 00	6.3614E -01	2.1475E 00	9.7133E -01
2	8	1.0388E 00	8.5047E -01	2.5642E 00	9.6903E -01
2	9	1.2510E 00	6.8607E -01	1.5943E 00	9.7764E -01
2	10	1.0537E 00	6.5940E -01	2.5307E 00	9.7011E -01
2	11	1.2577E 00	8.6496E -01	1.9713E 00	9.7133E -01
2	12	1.1116E 00	6.0123E -01	2.7544E 00	9.7002E -01

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DIMENSIONLESS PARAMETERS

Fig. 1 114 3/10/66 T_{inf} = 50°F AGGRESSIVE 130°F DUSTBUT AT JATA POINT 6

DATA FLINT	SIA	NU(F)	PR(F)	RE(F)	T(F)	M(F)
1	1	1.495E 04	4.775E 00	2.503E 05	1.012E 00	6.003E 03
2	2	-5.370E 03	5.546E 02	2.204E 05	9.791E-01	-6.527E 03
3	3	2.348E 03	3.346E 02	3.421E 05	1.066E 00	1.353E 03
4	4	2.654E 04	4.669E 00	2.708E 05	1.010E 00	1.150E 03
5	5	2.654E 04	4.669E 00	2.708E 05	1.010E 00	1.150E 03
6	6	3.205E 03	3.0	3.533E 05	1.067E 00	2.350E 03
7	7	3.205E 03	3.0	3.533E 05	1.067E 00	2.350E 03
8	8	2.279E 03	2.056E 00	4.319E 05	1.010E 00	1.520E 03
9	9	7.354E 03	3.052E 00	3.270E 05	1.050E 00	4.552E 03
10	10	3.109E 03	2.053E 00	4.223E 05	1.040E 00	2.142E 03
11	11	1.024E 03	1.034E 00	5.217E 05	1.010E 00	1.070E 03
12	12	7.412E 03	3.017E 00	3.542E 05	1.060E 00	4.921E 03
13	13	3.374E 03	2.024E 00	4.005E 05	1.010E 00	2.343E 03
14	14	2.396E 03	1.031E 00	5.533E 05	1.052E 00	1.369E 03
15	15	4.412E 03	2.002E 00	4.007E 05	1.093E 00	3.642E 03
16	16	2.059E 03	1.090E 00	5.291E 05	1.149E 00	2.233E 03
17	17	5.398E 03	2.0459E 00	4.031E 05	1.010E 00	3.746E 03
18	18	2.743E 03	1.706E 00	5.804E 05	1.167E 00	2.215E 03

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LOCAL TEST PARAMETERS

TEST 115 DATA POINT 7 IS BURNOUT

STA	PE	T _E	T _B	T _I	DATA POINT 2		
					Q/A	Q/AP	H
1	4.71E-03	8.423E-01	2.460E-02	6.714E-02	3.359E-00	4.350E-02	1.937E-02
2	4.72E-03	9.043E-01	5.980E-02	2.788E-02	3.254E-00	3.392E-02	1.862E-02
3	4.723E-03	9.657E-01	6.210E-02	3.453E-02	7.348E-00	3.125E-02	2.680E-02

STA	L/D	DELTA E	LE	DATA POINT 3		
				Q/A	Q/AP	H
1	1.731E-01	5.300E-00	1.000E-00	3.268E-02	1.311E-01	5.163E-02
2	2.360E-01	5.220E-00	1.000E-00	3.510E-02	1.272E-01	4.921E-02
3	2.950E-01	3.730E-00	7.500E-01	4.475E-02	1.135E-01	3.054E-02

LOCAL TEST PARAMETERS

TEST 115 DATA POINT 7 IS BURNOUT

STA	PE	T _E	T _B	T _I	DATA POINT 3		
					Q/A	Q/AP	H
1	4.741E-03	5.218E-01	7.950E-02	6.560E-02	3.268E-02	1.311E-01	5.163E-02
2	4.747E-03	1.011E-02	7.560E-02	3.510E-02	1.272E-01	1.234E-01	2.507E-02
3	4.743E-03	1.101E-02	6.210E-02	4.475E-02	1.135E-01	1.166E-01	3.375E-02

STA	L/D	DELTA E	LE	DATA POINT 4		
				Q/A	Q/AP	H
1	1.731E-01	6.500E-00	1.000E-00	4.161E-02	1.720E-01	1.644E-01
2	2.360E-01	6.990E-00	1.000E-00	4.254E-02	1.697E-01	1.632E-01
3	2.950E-01	4.000E-01	7.500E-01	5.532E-02	1.481E-01	1.526E-01

LOCAL TEST PARAMETERS

TEST 115 DATA POINT 7 IS BURNOUT

STA	PE	T _E	T _B	T _I	DATA POINT 4		
					Q/A	Q/AP	H
1	4.736E-03	5.500E-01	9.650E-02	6.714E-02	4.161E-02	1.720E-01	1.644E-02
2	4.722E-03	1.113E-02	5.838E-02	2.788E-02	4.254E-02	1.697E-01	1.632E-02
3	4.730E-03	1.220E-02	6.210E-02	3.453E-02	5.532E-02	1.481E-01	1.526E-02

STA	L/D	DELTA E	LE	DATA POINT 5		
				Q/A	Q/AP	H
1	1.731E-01	7.600E-00	1.000E-00	4.161E-02	1.720E-01	1.644E-02
2	2.360E-01	7.530E-00	1.000E-00	4.254E-02	1.697E-01	1.632E-02
3	2.950E-01	5.260E-00	7.500E-01	5.532E-02	1.481E-01	1.526E-02

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LOCAL TEST PARAMETERS

----- 114 3/16KA-5 TUBE WALL TEMP AGREEMENT=100% DURBUT AT DATA POINT 6

LOCAL TEST PARAMETERS

TEST 115 DATA POINT 7 IS CURRENT

DATA POINT 5						
STA	Pb	T _b	T _a	T _f	W/A	Q/AP
1	4.704E 03	1.049E 02	1.000E 03	0.541E 02	1.097E 02	1.097E 02
2	4.705E 03	1.049E 02	1.000E 03	0.730E 02	1.090E 01	1.077E 01
3	4.701E 03	1.321E 02	1.130E 03	0.994E 02	1.732E 01	1.774E 01

DATA POINT 6						
STA	Pb	T _b	T _a	T _f	W/A	Q/AP
1	4.706E 03	1.110E 02	1.090E 03	0.650E 02	2.291E 01	2.197E 01
2	4.701E 03	1.279E 02	1.203E 03	0.929E 02	2.279E 01	2.109E 01
3	4.656E 03	1.446E 02	1.252E 03	0.694E 02	1.956E 01	2.035E 01

DATA POINT 7						
STA	Pb	T _b	T _a	T _f	W/A	Q/AP
1	4.701E 03	1.279E 02	1.203E 03	0.929E 02	2.279E 01	2.197E 01
2	4.701E 03	1.279E 02	1.203E 03	0.929E 02	2.279E 01	2.197E 01
3	4.656E 03	1.446E 02	1.252E 03	0.694E 02	1.956E 01	2.035E 01

LOCAL TEST PARAMETERS

TEST 115 DATA POINT 7 IS CURRENT

DATA POINT 6						
STA	Pb	T _b	T _a	T _f	W/A	Q/AP
1	4.706E 03	1.110E 02	1.090E 03	0.650E 02	2.291E 01	2.197E 01
2	4.701E 03	1.279E 02	1.203E 03	0.929E 02	2.279E 01	2.197E 01
3	4.656E 03	1.446E 02	1.252E 03	0.694E 02	1.956E 01	2.035E 01

DATA POINT 7						
STA	Pb	T _b	T _a	T _f	W/A	Q/AP
1	4.701E 03	1.279E 02	1.203E 03	0.929E 02	2.279E 01	2.197E 01
2	4.701E 03	1.279E 02	1.203E 03	0.929E 02	2.279E 01	2.197E 01
3	4.656E 03	1.446E 02	1.252E 03	0.694E 02	1.956E 01	2.035E 01

LOCAL TEST PARAMETERS

TEST 115 DATA POINT 7 IS CURRENT

DATA POINT 6						
STA	Pb	T _b	T _a	T _f	W/A	Q/AP
1	4.706E 03	1.201E 02	1.056E 03	0.164E 02	2.556E 01	2.471E 01
2	4.701E 03	1.352E 02	1.325E 03	0.357E 02	2.382E 01	2.433E 01
3	4.656E 03	1.503E 02	1.393E 03	0.746E 02	2.296E 01	2.722E 01

DATA POINT 7						
STA	Pb	T _b	T _a	T _f	W/A	Q/AP
1	4.701E 03	1.201E 02	1.056E 03	0.164E 02	2.556E 01	2.471E 01
2	4.701E 03	1.201E 02	1.056E 03	0.164E 02	2.556E 01	2.471E 01
3	4.656E 03	1.201E 02	1.056E 03	0.164E 02	2.556E 01	2.471E 01

DIMENSIONLESS PARAMETERS

TEST 115 DATA POINT 7 IS MISSING

DATA POINT	STA	ME	ME	ME	ME	ME
1	2	9.0616E-02	3.01601E-02	1.4244E-02	1.1973E-02	0.5937E-02
1	3	0.4721E-02	0.1845E-02	0.6781E-02	0.2857E-02	0.4442E-02
1	4	6.6923E-02	0.7090E-02	1.5380E-02	1.2670E-02	2.2010E-02
1	5	9.0946E-02	0.7194E-02	1.5977E-02	1.3577E-02	0.6571E-02
2	2	0.6926E-02	0.5942E-02	1.3937E-02	1.3610E-02	0.7170E-02
2	3	0.1342E-02	0.2521E-02	0.6740E-02	0.4377E-02	0.3890E-02
2	4	0.9109E-03	0.4229E-02	0.6159E-02	0.4390E-02	0.6100E-02
2	5	5.5792E-02	0.6852E-02	1.7362E-02	1.4858E-02	0.6255E-02
2	6	0.6333E-02	0.7922E-02	1.6916E-02	1.5921E-02	0.6916E-02
2	7	0.1544E-03	0.1376E-02	1.7928E-02	1.5804E-02	0.7330E-02
2	8	5.9546E-02	3.7533E-02	1.6570E-02	1.5453E-02	0.6255E-02
2	9	0.6777E-02	3.4068E-02	2.8837E-02	1.7380E-02	0.6007E-02
2	10	1.0543E-03	3.9552E-02	1.7779E-02	1.6181E-02	0.6833E-02
2	11	1.0016E-03	3.5343E-02	1.5521E-02	1.4610E-02	0.6016E-02
2	12	7.0323E-02	3.0175E-02	1.3774E-02	1.7892E-02	0.6433E-02
2	13	1.1273E-02	3.7397E-02	1.6507E-02	1.5453E-02	0.6521E-02
2	14	1.0643E-03	3.2777E-02	2.6568E-02	1.6421E-02	0.7330E-02
2	15	7.0862E-02	2.7269E-02	2.2739E-02	1.8679E-02	0.6154E-02
2	16	9.5323E-02	3.4909E-02	1.9423E-02	1.8053E-02	0.7812E-02
2	17	1.0571E-03	3.0176E-02	1.9138E-02	1.6710E-02	0.6533E-02
2	18	0.6737E-02	2.0665E-02	2.4324E-02	1.9897E-02	0.5121E-02

DATA POINT	STA	K RATIO	MU RATIO	MU RATIO	CP RATIO
1	1	0.0461E-00	0.6510E-01	1.9701E-00	1.0000E-00
1	2	1.0463E-00	0.5773E-01	1.9303E-00	1.0000E-00
1	3	1.0650E-00	0.5042E-01	2.2452E-00	1.0100E-00
1	4	1.0836E-00	0.2345E-01	2.6335E-01	1.0157E-00
1	5	1.0861E-00	0.2869E-01	2.6063E-00	1.0146E-00
1	6	1.1174E-00	0.2663E-01	3.2034E-00	1.0298E-00
1	7	1.1140E-00	0.2144E-01	3.1973E-00	1.0219E-00
1	8	1.1186E-00	0.3233E-01	3.1c34E-00	1.0205E-00
1	9	1.1722E-00	0.5680E-01	4.0302E-00	1.0404E-00
1	10	1.1561E-00	0.3613E-01	3.9536E-01	1.0349E-00
1	11	1.1565E-00	0.5269E-01	3.7543E-00	1.0360E-00
1	12	1.2280E-00	0.22573E-01	4.3026E-01	1.0580E-00
1	13	1.1793E-00	0.5192E-01	4.2753E-01	1.0423E-00
1	14	1.1255E-00	0.7620E-01	4.1193E-01	1.0464E-01
1	15	1.2455E-00	0.7074E-01	2.0632E-01	1.0771E-01
1	16	1.1944E-00	0.7193E-01	4.4352E-01	1.0250E-01
1	17	1.2001E-00	0.6252E-01	4.2135E-01	1.0548E-01
1	18	1.2506E-00	1.0712E-01	5.3143E-01	1.0577E-01
1	19	1.2547E-00	0.6903E-01	5.5925E-01	1.0313E-01
1	20	1.2214E-00	0.4949E-01	4.3327E-01	1.0684E-01
1	21	1.2315E-00	1.2325E-01	5.0153E-01	1.1507E-01

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DIMENSIONLESS PARAMETERS

FOR THE DATA POINT 7 IS SUBROUTINE

DATA POINT	STA	SL(F)	PR(F)	WE(F)	T/L(F)	ME(F)
1	1	1.3478E-02	3.2121E-00	2.0904E-05	1.0893E-00	5.2233E-02
1	2	7.710E-02	3.0673E-00	2.1651E-05	1.0933E-00	4.0997E-02
1	3	2.4693E-02	2.6680E-00	2.4139E-05	1.1183E-00	3.6934E-02
1	4	7.0760E-02	2.3899E-00	2.6610E-05	1.1449E-00	5.0291E-02
2	1	2.4693E-02	2.0857E-00	2.6957E-05	1.1460E-00	5.4815E-02
2	2	7.0729E-02	1.9135E-00	3.0490E-05	1.1627E-00	6.00407E-02
2	3	2.4206E-02	1.9632E-00	3.0062E-05	1.1801E-00	6.6481E-02
2	4	7.4230E-02	1.8650E-00	3.1673E-05	1.1826E-00	6.4382E-02
2	5	2.2118E-02	1.8650E-00	3.1673E-05	1.1826E-00	6.4382E-02
2	6	7.4739E-02	1.4739E-00	3.9500E-05	1.2289E-00	4.8049E-02
2	7	2.0592E-02	1.6148E-00	3.5336E-05	1.2294E-00	7.6927E-02
2	8	5.4460E-02	1.3946E-00	3.6984E-05	1.2354E-00	7.1688E-02
2	9	7.4777E-02	1.1733E-00	4.7202E-05	1.2693E-00	5.3909E-02
2	10	2.0536E-02	1.4744E-00	3.6589E-05	1.2363E-00	7.4683E-02
2	11	2.2119E-02	1.3750E-00	4.1207E-05	1.2349E-00	7.5689E-02
2	12	7.4739E-02	1.0734E-00	2.1635E-05	1.2933E-00	5.9803E-02
2	13	2.0592E-02	1.3613E-00	4.1101E-05	1.2462E-00	5.4944E-02
2	14	5.5555E-02	1.2693E-00	4.3102E-05	1.2430E-00	6.5694E-02
2	15	4.2358E-02	5.5072E-01	5.7756E-05	1.3031E-00	6.4924E-02
2	16	1.0410E-02	1.0754E-00	5.0473E-05	1.2970E-00	7.9334E-02
2	17	1.6927E-02	1.1377E-00	4.0052E-05	1.2579E-00	9.1799E-02
2	18	4.1139E-02	3.16592E-01	6.6813E-05	1.3326E-00	5.6924E-02

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

TEST 116 BURNOUT AT DATA POINT 7

AF = 0.138E-03 D = 0.132E-01 L = 0.350E 01 DELTA TO = 0.140E 01

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	E2	12	OP	MT BAL	6
1	3.904E 03	3.854E 03	1.222E 02	1.268E 02	1.037E 00	9.930E 00	4.522E 02	4.257E 00	1.567E 01	7.843E 03
2	3.933E 03	3.854E 03	1.226E 02	1.384E 02	1.098E 00	1.521E 01	6.840E 02	9.663E 00	-1.204E 00	7.832E 03
3	3.952E 03	3.946E 03	1.218E 02	1.480E 02	1.068E 00	2.052E 01	9.100E 02	1.777E 01	2.093E 00	7.893E 03
4	3.965E 03	3.917E 03	1.216E 02	1.565E 02	1.088E 00	2.337E 01	1.028E 03	2.278E 01	-2.116E 00	7.832E 03
5	3.959E 03	3.914E 03	1.218E 02	1.660E 02	1.075E 00	2.629E 01	1.140E 03	2.861E 01	-3.466E 00	7.793E 03
6	3.956E 03	3.907E 03	1.218E 02	1.747E 02	1.072E 00	2.644E 01	1.230E 03	3.330E 01	-6.500E 00	7.774E 03
7	3.956E 03	3.906E 03	1.218E 02	1.613E 02	1.069E 00	2.950E 01	1.284E 03	3.591E 01	-1.145E 01	7.752E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST 116 BURNOUT AT DATA POINT 7

DATA POINT 1

STA	PL	TB	TB	T1	Q/A	Q/AP	H	DEL TF	VS
1	3.446E 03	1.246E 02	2.880E 02	1.807E 02	2.507E 00	2.456E 00	4.376E-02	5.613E 01	9.008E 01
2	3.4772E 03	1.265E 02	2.770E 02	1.698E 02	2.509E 00	2.456E 00	5.607E-02	4.229E 01	9.015E 01
3	3.4858E 03	1.203E 02	2.970E 02	1.796E 02	2.507E 00	2.456E 00	4.788E-02	5.130E 01	9.022E 01

DATA POINT 1

LOCAL TEST PARAMETERS

TEST 116 BURNOUT AT DATA POINT 7

DATA POINT 2							
STA	PB	TB	TW	T _I	Q/A	Q/AP	V _S
1	3.049E-03	1.0262E-02	4.060E-02	2.0596E-02	5.011E-00	5.090E-00	0.964E-01
2	3.049E-03	1.0229E-02	4.067E-02	2.0373E-02	5.018E-00	5.090E-00	0.961E-01
3	3.057E-03	1.0373E-02	4.0790E-02	2.0514E-02	5.013E-00	5.090E-00	0.959E-01

LOCAL TEST PARAMETERS

TEST 116 BURNOUT AT DATA POINT 7

DATA POINT 3							
STA	PB	TB	TW	T _I	Q/A	Q/AP	V _S
1	3.0479E-03	1.0312E-02	7.008E-02	3.041E-02	1.043E-01	1.021E-01	0.932E-02
2	3.0495E-03	1.0306E-02	6.006E-02	2.001E-02	1.046E-01	1.021E-01	7.157E-02
3	3.0561E-03	1.0461E-02	6.076E-02	2.004E-02	1.043E-01	1.021E-01	6.906E-02

LOCAL TEST PARAMETERS

TEST 116 BURNOUT AT DATA POINT 7

DATA POINT 4							
STA	PB	TB	TW	T _I	Q/A	Q/AP	V _S
1	3.0498E-03	1.0341E-02	8.000E-02	3.017E-02	1.033E-01	1.014E-01	5.100E-02
2	3.0334E-03	1.0440E-02	7.990E-02	3.020E-02	1.034E-01	1.015E-01	7.221E-02
3	3.0220E-03	1.0540E-02	8.000E-02	3.007E-02	1.036E-01	1.014E-01	6.562E-02

TEST 116 BURNOUT AT DATA POINT 7							
STA	L/D	DELTA E	L _E	Q/A	Q/AP	N	V _S
1	7.0668E-00	2.0337E-01	3.000E-00			5.100E-02	2.577E-02
2	1.0416E-01	2.0337E-01	3.000E-00			7.221E-02	1.828E-02
3	2.0046E-01	2.0337E-01	3.000E-00			6.562E-02	9.097E-02

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LOCAL TEST PARAMETERS

TEST 116 SUBMANT AT DATA POINT 7

		DATA POINT 5				
STA	ρ_D	T_b	T_u	T_w	T_f	W/A
1	3.0542E-03	1.03	1.0376E-02	3.0780E-02	4.0638E-02	1.057E-01
2	3.0529E-03	1.0202E-02	9.2602E-02	3.5630E-02	1.051E-01	1.051E-01
3	3.0516E-03	1.0625E-02	5.7002E-02	4.114E-02	1.090E-01	1.051E-01

		DATA POINT 6				
STA	ρ_D	T_b	T_u	T_w	T_f	W/A
1	3.0435E-03	1.0407E-02	1.0100E-03	4.7732E-02	1.0566E-01	1.926E-01
2	3.0424E-03	1.0550E-02	1.0450E-03	4.0280E-02	1.0970E-01	1.926E-01
3	3.0413E-03	1.0703E-02	1.0930E-03	4.6200E-02	1.0966E-01	1.926E-01

LOCAL TEST PARAMETERS

TEST 116 SUBMANT AT DATA POINT 7

		DATA POINT 6				
STA	ρ_D	T_b	T_u	T_w	T_f	W/A
1	2.9954E-03	1.0430E-02	1.0100E-03	4.7732E-02	1.0566E-01	1.926E-01
2	2.9943E-03	1.0550E-02	1.0450E-03	4.0280E-02	1.0970E-01	1.926E-01
3	2.9932E-03	1.0703E-02	1.0930E-03	4.6200E-02	1.0966E-01	1.926E-01

		DATA POINT 7				
STA	ρ_D	T_b	T_u	T_w	T_f	W/A
1	2.9474E-03	1.0430E-02	1.0100E-03	5.0900E-02	2.1100E-01	2.072E-01
2	2.9463E-03	1.0550E-02	1.0450E-03	4.7030E-02	2.1110E-01	2.072E-01
3	2.9452E-03	1.0703E-02	1.0930E-03	4.6200E-02	2.1120E-01	2.072E-01

LOCAL TEST PARAMETERS

TEST 116 SUBMANT AT DATA POINT 7

		DATA POINT 7				
STA	ρ_D	T_b	T_u	T_w	T_f	W/A
1	2.9474E-03	1.0430E-02	1.0100E-03	5.0900E-02	2.1100E-01	2.072E-01
2	2.9463E-03	1.0550E-02	1.0450E-03	4.7030E-02	2.1110E-01	2.072E-01
3	2.9452E-03	1.0703E-02	1.0930E-03	4.6200E-02	2.1120E-01	2.072E-01

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DIMENSIONLESS PARAMETERS

TEST 116 BURNOUT AT DATA POINT 7

DATA POINT	STA	MU	PR	RE	T/TB	MU/PR(=1)
1	1	4.2206E-02	3.5649E-30	1.4532E-05	1.0960E-00	5.0596E-02
1	2	1.0680E-03	3.3134E-30	1.9833E-05	1.0721E-00	6.7361E-02
1	3	8.9450E-02	3.2676E-00	2.0075E-05	1.0872E-00	5.5764E-02
1	4	6.0970E-02	3.2699E-00	1.9934E-05	1.2232E-00	5.0418E-02
2	1	1.0104E-03	3.1611E-00	2.0501E-05	1.1764E-00	6.3762E-02
2	2	9.1966E-02	3.0677E-00	2.1054E-05	1.1910E-00	5.9790E-02
2	3	9.3630E-02	3.1985E-00	2.0453E-05	1.3433E-00	5.4940E-02
3	1	4.3172E-03	3.0313E-00	2.1379E-05	1.2384E-00	5.9528E-02
3	2	1.2570E-03	2.8621E-00	2.2281E-05	1.2446E-00	8.2386E-02
3	3	9.4485E-02	3.1313E-00	2.0631E-05	1.4337E-00	5.9853E-02
3	4	1.3169E-03	2.9224E-00	2.1867E-05	1.3613E-00	8.5982E-02
3	5	1.2039E-03	2.7375E-00	2.3071E-05	1.3203E-00	6.0473E-02
3	6	9.7930E-02	3.0537E-00	2.0995E-05	1.5193E-00	6.2659E-02
3	7	1.4577E-03	2.8560E-00	2.2504E-05	1.3361E-00	9.6478E-02
3	8	1.1828E-03	2.5629E-00	2.4104E-05	1.3991E-00	8.9923E-02
3	9	1.0493E-03	2.9890E-00	2.1308E-05	1.5604E-00	6.7774E-02
3	10	1.4013E-03	2.7055E-00	2.3124E-05	1.4011E-00	9.4111E-02
3	11	1.1644E-03	2.6527E-00	2.5100E-05	1.4622E-00	8.1345E-02
3	12	1.0356E-03	2.9417E-00	2.1523E-05	1.6068E-00	6.7259E-02
3	13	1.1703E-03	2.6303E-00	2.3601E-05	1.5194E-00	7.9480E-02
3	14	1.2693E-03	2.3622E-00	2.5637E-05	1.4487E-00	9.9901E-02

DATA POINT	STA	MU RATIO	K RATIO	MU RATIO	CP RATIO
1	1	1.0243E-00	9.2842E-01	1.3663E-01	3.7316E-01
1	2	1.0162E-00	9.4390E-01	1.2683E-00	9.7347E-01
1	3	1.0222E-00	9.3469E-01	1.3261E-00	9.7228E-01
1	4	1.0595E-00	9.8365E-01	1.0461E-00	9.5662E-01
1	5	1.0969E-00	9.9876E-01	1.6623E-00	9.6697E-01
1	6	1.0515E-00	9.9895E-01	1.7122E-00	9.6461E-01
1	7	1.0534E-00	8.7144E-01	2.4362E-00	9.6966E-01
1	8	1.0655E-00	8.5033E-01	1.5052E-00	9.6473E-01
1	9	1.0654E-00	8.9055E-01	1.9205E-00	9.6336E-01
1	10	1.0249E-00	8.7665E-01	2.9075E-00	9.7509E-01
1	11	1.0856E-00	8.5837E-01	2.1953E-00	9.6532E-01
1	12	1.0932E-00	8.7939E-01	2.2693E-01	9.6416E-01
1	13	1.1E7DE-00	8.9257E-01	3.4257E-01	2.9292E-01
1	14	1.0374E-00	8.9462E-01	2.3527E-01	9.6344E-01
1	15	1.0225E-00	9.1487E-01	2.6522E-01	9.7600E-01
1	16	1.01753E-00	9.6556E-01	3.6053E-01	1.0228E-01
1	17	1.0408E-00	9.0522E-01	2.6761E-01	9.7425E-01
1	18	1.1503E-00	9.3752E-01	2.9828E-01	2.9423E-01
1	19	1.1956E-00	7.2432E-01	3.5585E-01	1.0135E-01
1	20	1.1051E-00	9.3031E-01	3.2950E-01	1.0006E-01
1	21	1.1477E-00	9.6452E-01	2.1927E-01	9.4387E-01

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DIMENSIONLESS PARAMETERS

TEST 116 BURNOUT AT DATA POINT 7

DATA PCINT	STA	MU(F)	Psi(F)	R(E/F)	TLS/T	WINDSHEAR
1	2	7.8983E-02	2.0761E-00	2.2779E-00	1.045E-00	2.2610E-00
1	3	1.0555E-03	2.0554E-00	2.2238E-00	1.034E-00	2.2301E-00
2	3	8.6271E-02	2.0730E-00	2.2964E-00	1.041E-00	2.2704E-00
2	4	7.4578E-02	2.0145E-00	2.7535E-00	1.190E-00	2.4653E-00
3	4	9.4509E-02	2.0263E-00	2.6563E-00	1.081E-00	2.6409E-00
4	5	6.5793E-02	2.0139E-00	2.7703E-00	1.067E-00	2.3894E-00
4	6	6.0117E-02	1.0781E-00	3.2153E-00	1.146E-00	6.4616E-00
5	6	1.0216E-02	1.0980E-00	2.9530E-00	1.150E-00	3.2451E-00
5	7	1.1644E-03	1.0866E-00	3.0913E-00	1.169E-00	3.0320E-00
6	7	6.4097E-02	1.0563E-00	3.0566E-00	1.178E-00	7.0330E-00
6	8	1.2961E-03	1.0769E-00	3.2003E-00	1.138E-00	3.4161E-00
7	8	1.1064E-03	1.0632E-00	3.4603E-00	1.130E-00	9.0947E-00
7	9	4.6777E-02	1.0364E-00	3.9286E-00	1.266E-00	7.6145E-00
8	9	1.3322E-03	1.0630E-00	3.6423E-00	1.1630E-00	1.6904E-00
8	10	1.0865E-03	1.0418E-00	3.6938E-00	1.166E-00	9.6443E-00
9	10	9.3074E-02	1.0369E-00	4.1463E-00	1.210E-00	6.3770E-00
9	11	1.2781E-03	1.0463E-00	3.7692E-00	1.1671E-00	1.6277E-00
10	11	1.0725E-03	1.0261E-00	4.3102E-00	1.1977E-00	9.7754E-00
10	12	9.1873E-02	1.0218E-00	4.3753E-00	1.2326E-00	6.4868E-00
11	12	1.0634E-03	1.0254E-00	4.2995E-00	1.2833E-00	9.7122E-00
11	13	1.1770E-03	1.0246E-00	4.3651E-00	1.1632E-00	1.0770E-00

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 117 3/16" X 4 TUBE FIRST DATA POINT ONLY

AP = 6.136E-03 D = 0.132E-01 L = 9.460E-01 DELTA TD = 0.520E-01

DATA POINTS

FC11AT	PB-IN	PB-OUT	TB-IN	TB-OUT	N	E2	12	DP	HT GNL	6
1	3.744E-03	3.562E-03	7.180E-01	1.046E-02	2.350E-00	3.380E-01	1.316E-03	4.224E-01	-4.964E-00	1.784E-00

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 117 3/16" X 4" TUBE FIRST DATA POINT ONLY

DATA POINT 1									
SIA	P _L	T ₀	T _a	T _b	T _c	T _d	T _e	T _f	T _g
1	2.062E-03	0.7C2E-01	1.010E-03	0.100E-02	2.100E-01	2.010E-01	0.300E-02	3.220E-02	0.010E-02
2	3.057E-03	0.572E-01	1.132E-03	0.677E-02	2.100E-01	2.030E-01	0.700E-02	3.700E-02	0.000E-02
3	3.051E-03	1.000E-02	1.0137E-03	0.745E-02	2.100E-01	2.030E-01	0.700E-02	3.700E-02	0.000E-02
SIA	L/D	DELTA L	LE						
1	1.0ACIE C1	0.560E-03	1.000E-03						
2	1.0731E C1	1.0493E-01	1.0750E-03						
3	2.036CE C1	1.0472E-01	1.0750E-03						

CIPLASTICNESS PARAMETERS

TEST 117 3/16" X 4" TUBE FIRST DATA POINT ONLY

DATA POINT	SIA	R ₀	R _P	R _E	R _U	R _{UTS}	R _{UR} (%)
1	1	1.0112E-03	0.6620E-03	3.2107E-03	1.5599E-03	7.0000E-03	
1	2	1.0104E-03	0.7849E-03	3.4557E-03	1.6694E-03	6.2513E-03	
1	3	1.0157E-03	3.0727E-03	3.6800E-03	1.6657E-03	6.3000E-03	

DATA POINT	SIA	WIND RATIO	R ₀	R _U RATIO	CP MATIC
1	1	1.0101E-03	0.1949E-01	0.3740E-03	9.6000E-01
1	2	1.0105E-03	0.1942E-01	0.5140E-03	1.0000E-00
1	3	1.0157E-03	0.5793E-01	0.6032E-03	1.3000E-00

TEST 117 3/16" X 4" TUBE FIRST DATA POINT ONLY

DATA POINT	SIA	MUL(F)	PR(F)	ME(F)	TE(F)	ME(%)
1	1	1.0CS2E-03	1.034E-03	7.321E-03	1.2213E-00	0.0700E-02
1	2	1.0329E-02	1.0443E-03	3.152E-03	1.2500E-00	0.0432E-02
1	3	9.3665E-02	1.03997E-03	8.403E-03	1.2049E-00	0.1577E-02

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 117 NO INSULANT HEATED DELTA P TEST

$\Delta F = C_{0.25} \times 10^{-3}$ $D = C_{0.10} \times 10^{-3}$ $L = 0.5000 \times 10^{-3}$ $\Delta T_{FD} = 0.1300 \times 10^{-3}$

DATA POINTS

POINT	P-T-1A	P-T-CUT	TU-IN	TU-OUT	E1	E2	12	6	WT. SENS.
1	4.653E-03	4.120E-03	7.000E-01	6.720E-01	1.280E-00	1.625E-01	1.14E-02	1.00E-02	-0.175E-03
2	4.190E-03	4.122E-03	7.000E-01	6.980E-01	1.277E-00	2.223E-01	9.90E-02	2.10E-02	-7.75E-03
3	4.190E-03	4.116E-03	7.000E-01	6.130E-02	1.273E-00	2.735E-01	1.213E-03	3.142E-01	-7.275E-03

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 119 NO BURNOUT HEATED DELTA P TEST

STA	ρ_{in}	T_0	DATA POINT 1		ρ_{out}	T_1	ΔA	V_2
			TB	TG				
1	4.124E-03	9.352E-01	3.924E-02	2.750E-02	2.503E-02	3.048E-02	3.148E-02	1.920E-02
2	4.127E-03	9.357E-01	3.900E-02	2.688E-02	3.024E-02	3.318E-02	2.132E-02	1.640E-02
STA	L/D	DELTA E	LE					
1	1.705E-01	2.169E-00	1.000E-00					
2	2.161E-01	2.605E-00	7.500E-01					

LOCAL TEST PARAMETERS

TEST 119 NO BURNOUT HEATED DELTA P TEST

STA	ρ_{in}	T_0	DATA POINT 2		ρ_{out}	T_1	ΔA	V_2
			TB	TG				
1	4.124E-03	9.352E-01	6.100E-02	6.100E-02	5.300E-02	5.017E-02	1.000E-02	3.022E-02
2	4.127E-03	9.357E-01	6.200E-02	6.200E-02	5.700E-02	6.300E-02	2.200E-02	2.000E-02
STA	L/D	DELTA E	LE					
1	1.705E-01	2.169E-00	1.000E-00					
2	2.161E-01	2.605E-00	7.500E-01					

LOCAL TEST PARAMETERS

TEST 119 NO BURNOUT HEATED DELTA P TEST

STA	ρ_{in}	T_0	DATA POINT 3		ρ_{out}	T_1	ΔA	V_2
			TB	TG				
1	4.122E-03	1.019E-02	8.000E-02	8.000E-02	5.000E-02	5.000E-02	2.000E-02	4.330E-02
2	4.117E-03	1.015E-02	8.200E-02	8.200E-02	5.200E-02	5.400E-02	2.344E-02	3.771E-02
STA	L/D	DELTA E	LE					
1	1.705E-01	2.169E-00	1.000E-00					
2	2.161E-01	2.605E-00	7.500E-01					

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DIMENSIONLESS PARAMETERS

TEST 117: NEW BURST HEATED DELTA P TEST

		DATA POINTS							
		SIA	AU	PA	PE	RE	TE/TP	DATA POINTS	
1	1	1.0241E-02	4.0394E-02	1.0220E-02	1.0353E-02	1.0353E-02	2.0111E-02	2.0111E-02	2.0111E-02
1	2	1.0054E-02	4.0054E-02	1.0250E-02	1.0250E-02	1.0250E-02	2.0175E-02	2.0175E-02	2.0175E-02
2	1	4.0415E-02	1.0240E-02	4.0415E-02	1.0320E-02	1.0320E-02	2.0710E-02	2.0710E-02	2.0710E-02
2	2	6.0250E-02	1.0050E-02	6.0185E-02	1.0200E-02	1.0200E-02	2.0970E-02	2.0970E-02	2.0970E-02
3	1	5.0358E-02	9.0240E-02	4.0024E-02	1.0420E-02	1.0420E-02	3.0931E-02	3.0931E-02	3.0931E-02
3	2	6.0745E-02	3.0745E-02	3.0745E-02	1.0510E-02	1.0510E-02	3.0970E-02	3.0970E-02	3.0970E-02

		DATA POINTS							
		SIA	AU	PA	PE	RE	TE/TP	DATA POINTS	
1	1	1.0077E-02	6.0197E-02	6.0197E-02	2.0765E-02	2.0765E-02	9.0310E-01	9.0310E-01	9.0310E-01
1	2	1.0090E-02	6.0190E-02	6.0190E-02	2.0837E-02	2.0837E-02	9.0250E-01	9.0250E-01	9.0250E-01
2	1	1.0152E-02	6.0152E-02	6.0267E-02	6.0199E-02	6.0199E-02	9.0461E-01	9.0461E-01	9.0461E-01
2	2	1.0134E-02	6.0134E-02	6.0290E-02	6.0357E-02	6.0357E-02	9.0837E-01	9.0837E-01	9.0837E-01
3	1	1.0075E-02	6.0075E-02	6.0292E-02	6.0563E-02	6.0563E-02	1.0309E-01	1.0309E-01	1.0309E-01
3	2	1.0150E-02	6.0150E-02	6.0729E-02	6.0589E-02	6.0589E-02	1.0103E-01	1.0103E-01	1.0103E-01

DIMENSIONLESS PARAMETERS

TEST 118: NEW BURST HEATED DELTA P TEST

		DATA POINTS							
		SIA	AU	PA	PE	RE	TE/TP	DATA POINTS	
1	1	3.0361E-02	6.0359E-02	3.0359E-02	2.1639E-02	2.1639E-02	1.1592E-01	1.1592E-01	2.0000E-01
1	2	5.0232E-02	6.0496E-02	5.0496E-02	2.0634E-02	2.0634E-02	1.1363E-01	1.1363E-01	3.0130E-02
2	1	6.0121E-02	6.0429E-02	6.0429E-02	2.0644E-02	2.0644E-02	1.1225E-01	1.1225E-01	3.0390E-02
2	2	7.0270E-02	6.0738E-02	6.0738E-02	2.0741E-02	2.0741E-02	1.1299E-01	1.1299E-01	6.0200E-02
3	1	6.0310E-02	6.0269E-02	6.0429E-02	3.0627E-02	3.0627E-02	1.2775E-01	1.2775E-01	4.0130E-02
3	2	7.0356E-02	6.0347E-02	6.0697E-02	3.0697E-02	3.0697E-02	1.2843E-01	1.2843E-01	5.0093E-02

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Liquid Side Heat Transfer Test Data

GENERAL TEST PARAMETERS

TEST 123 AND ELEMENT HEATED MELTA P TEST

AF = 0.13E-03 D = 0.132E-01 L = 0.500E 01 DATA TD = 0.230E 01

DATA POINTS

POINT	PB-IN	PB-OUT	TE-IN	TE-OUT	0	F2	F3	F4	F5	F6	F7	F8
1	4.003E 03	3.575E 03	5.050E 01	7.720E 01	1.0100E 00	1.951E 01	6.000E 02	1.0102E 01	-2.327E 00	0.130E 00	0.130E 00	0.130E 00
2	0.300E 03	3.559E 03	6.010E 01	9.500E 01	1.0100E 00	2.052E 01	8.000E 02	2.017E 01	-0.500E 00	0.100E 00	0.100E 00	0.100E 00
3	2.988E 03	3.639E 03	5.050E 01	1.0120E 02	1.0100E 00	3.051E 01	1.000E 02	3.011E 01	-1.000E 00	-1.000E 00	-1.000E 00	-1.000E 00

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 121 NO EXHAUST HEATED DELTA P TEST

		DATA POINT 1							
STA	PB	1B	1B	T1	0/A	DP/AP	H	DEL TF	V3
1	2.954E-03	7.688E-01	4.649E-02	2.332E-02	0.231E-00	6.274E-00	2.644E-02	1.694E-02	9.674E-01
2	3.698E-03	7.682E-01	4.036E-02	2.146E-02	0.714E-00	4.514E-00	3.268E-02	1.303E-02	9.664E-01
STA	L/D	DELTA L	LE						
1	2.626E-01	2.670E-00	1.606E-00						
2	2.655E-01	2.692E-00	7.585E-01						

LOCAL TEST PARAMETERS

TEST 121 NO EXHAUST HEATED DELTA P TEST

		DATA POINT 2							
STA	PB	1B	1B	T1	0/A	DP/AP	H	DEL TF	V3
1	3.6579E-03	6.668E-01	7.624E-02	3.794E-02	9.274E-00	0.381E-00	3.204E-02	2.692E-02	9.768E-01
2	3.6561E-03	9.461E-01	7.619E-02	3.649E-02	1.011E-01	9.732E-00	3.035E-02	2.553E-02	9.733E-01
STA	L/D	DELTA L	LE						
1	2.626E-01	2.653E-00	1.694E-00						
2	2.655E-01	2.633E-00	7.558E-01						

LOCAL TEST PARAMETERS

TEST 121 NO EXHAUST HEATED DELTA P TEST

		DATA POINT 3							
STA	PB	1B	1B	T1	0/A	DP/AP	H	DEL TF	V3
1	3.6521E-03	9.692E-01	5.642E-02	4.734E-02	1.615E-01	1.031E-01	3.729E-02	3.677E-02	9.677E-01
2	3.6932E-03	1.059E-01	5.639E-02	4.644E-02	1.444E-01	1.451E-01	4.279E-02	3.391E-02	9.716E-01
STA	L/D	DELTA L	LE						
1	2.626E-01	8.674E-00	1.665E-00						
2	2.655E-01	5.128E-00	7.550E-01						

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DIMENSIONLESS PARAMETERS

TEST 121 NO BURNOUT HEATED DELTA P TEST

DATA POINT	STA	NU	PR	RE	T1/TF	NU/PR(1.4)
1	1	5.4319E-02	5.4738E-00	1.4161E-05	1.3816E-00	2.7515E-02
1	2	6.6148E-02	5.2527E-00	1.4679E-05	1.2578E-00	3.4958E-02
2	1	6.3701E-02	4.6696E-00	1.6297E-05	1.5253E-00	3.4433E-02
2	2	7.5479E-02	4.3531E-00	1.7505E-05	1.4609E-00	3.1908E-02
3	1	7.2805E-02	4.1511E-00	1.7828E-05	1.6787E-00	4.1268E-02
3	2	8.2195E-02	3.8015E-00	1.9194E-05	1.5993E-00	4.3180E-02

DATA POINT	STA	NU/RATIO	K RATIO	NU RATIO	CP RATIO
1	1	1.0715E-00	8.2049E-01	2.6014E-00	9.8872E-01
1	2	1.0610E-00	8.3633E-01	2.3230E-00	9.8643E-01
2	1	1.1405E-00	8.1583E-01	3.9101E-00	9.8393E-01
2	2	1.1207E-00	8.2233E-01	3.3268E-00	9.7791E-01
3	1	1.1571E-00	8.5288E-01	8.8491E-00	1.0088E-00
3	2	1.1714E-00	8.5657E-01	4.1193E-00	9.9627E-01

DIMENSIONLESS PARAMETERS

TEST 121 NO BURNOUT HEATED DELTA P TEST

DATA POINT	STA	NU(F)	PR(F)	RE(F)	T1/TF	NU/PR(1.4)
1	1	4.0454E-02	2.7544E-00	2.4452E-05	1.1308E-00	3.2066E-02
1	2	5.5528E-02	2.4949E-00	2.3585E-05	1.1142E-00	3.8911E-02
2	1	5.3576E-02	1.7761E-00	3.4595E-05	1.2111E-00	4.2573E-02
2	2	6.4581E-02	1.6722E-00	3.3269E-05	1.1873E-00	5.0256E-02
3	1	6.0581E-02	1.4977E-00	4.1874E-05	1.2534E-00	5.3168E-02
3	2	7.0155E-02	1.4631E-00	4.0699E-05	1.2293E-00	6.0249E-02

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 122 NO BURNOUT HEATED DELTA P TEST

$AF = 0.138E-02$ $D = 0.132E-01$ $L = 0.500E-01$ $\Delta T_0 = 0.160E-01$

DATA POINTS

POINT	PB-IN	PB-OUT	TE-IN	TE-OUT	W	E2	12	QP	HT BAL	G
1	4.627E 03	4.535E 03	6.320E 01	8.140E 01	1.180E 00	1.928E 01	6.110E 02	1.123E 01	-1.978E 01	8.557E 03
2	4.536E 03	4.447E 03	6.340E 01	9.400E 01	1.189E 00	2.848E 01	6.870E 02	2.395E 01	-6.532E 00	8.557E 03
3	4.445E 03	4.356E 03	6.350E 01	1.159E 02	1.190E 00	3.534E 01	1.990E 03	3.652E 01	-5.438E 00	8.627E 03

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 122 NO BURNOUT HEATED DELTA P TEST

STA	P ₀	T ₀	T _B	DATA POINT 1		G/A	Q/AP	H	SPL. TF	V ₂
				T ₁	T ₂					
1	4.561E 03	7.645E 01	4.180E 02	2.352E 02	4.553E 00	4.452E 00	4.452E 00	2.011E -02	1.500E 02	9.334E 01
2	4.563E 03	4.049E C1	4.200E 02	2.279E 02	4.776E 00	4.560E 00	4.560E 00	3.794E -02	1.472E 02	9.509E 01
STA	L/D	DELTA E	LE							
1	2.360E C1	3.646E 00	1.000E 00							
2	2.590E C1	2.593E 00	7.500E -01							

LOCAL TEST PARAMETERS

TEST 122 NO BURNOUT HEATED DELTA P TEST

STA	P ₀	T ₀	T _B	DATA POINT 2		G/A	Q/AP	H	SPL. TF	V ₂
				T ₁	T ₂					
1	4.469E 03	9.010E 01	7.130E 02	3.712E 02	9.647E 00	9.402E 00	9.402E 00	3.577E -02	2.011E 02	9.637E 01
2	4.451E C3	9.722E 01	7.150E 02	3.610E 02	9.666E 00	9.647E 00	9.647E 00	3.655E -02	2.033E 02	9.644E 01
STA	L/D	DELTA E	LE							
1	2.360E C1	5.640E 00	1.000E 00							
2	2.590E C1	4.360E 00	7.500E -01							

LOCAL TEST PARAMETERS

TEST 122 NO BURNOUT HEATED DELTA P TEST

STA	P ₀	T ₀	T _B	DATA POINT 3		G/A	Q/AP	H	SPL. TF	V ₂
				T ₁	T ₂					
1	4.377E 03	1.020E 02	9.490E 02	4.663E 02	1.472E 01	1.450E 01	1.450E 01	3.999E -02	3.633E 02	9.771E 01
2	4.355E C3	1.133E 02	9.510E 02	4.600E 02	1.496E 01	1.463E 01	1.463E 01	4.214E -02	3.467E 02	9.813E 01
STA	L/D	DELTA E	LE							
1	2.360E 01	7.610E 00	1.000E 00							
2	2.590E 01	5.360E 00	7.500E -01							

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DIMENSIONLESS PARAMETERS

TEST 122 MU ELEMENT RELATED DELTA P TEST

CATA POINT	STA	MU	PW	RE	T1/TF	MU/P (e-6)
1	1	5.6454E-32	5.2204E-05	1.44633E-05	1.2950E-05	2.9374E-02
1	2	6.2227E-02	5.0653E-05	1.5188E-05	1.2727E-05	3.2674E-02
2	1	6.6776E-02	4.5198E-05	1.45579E-05	1.5109E-05	3.6678E-02
2	2	7.1634E-02	4.2273E-05	1.75633E-05	1.4774E-05	4.8203E-02
3	1	7.7449E-02	4.0273E-05	1.84452E-05	1.6453E-05	4.4363E-02
3	2	8.0557E-02	3.6939E-05	1.3825E-05	1.6943E-05	6.7742E-02

CATA POINT	STA	MU RATIO	K RATIO	MU RATIO	CP RATIO	MU/P (e-6)
1	1	1.0167E-06	8.2524E-01	2.4804E-06	1.0026E-06	1.0026E-06
1	2	1.0654E-06	6.3380E-01	2.3261E-06	1.0032E-06	1.0032E-06
2	1	1.1422E-06	8.1971E-01	3.6904E-06	1.6034E-06	1.6034E-06
2	2	1.2590E-06	8.2746E-01	3.3702E-06	9.9939E-01	9.9939E-01
3	1	1.6777E-06	8.5289E-01	4.5437E-06	1.0269E-06	1.0269E-06
3	2	1.7852E-06	9.6453E-01	4.1512E-06	1.0163E-06	1.0163E-06

DIMENSIONLESS PARAMETERS

TEST 122 MU ELEMENT RELATED DELTA P TEST

CATA POINT	STA	MU(P)	RE(P)	MU(P)	RE(P)	MU/P (e-6)
1	1	5.0510E-02	2.7064E-05	2.04487E-05	1.1238E-05	3.3935E-02
1	2	5.5727E-02	1.7327E-05	2.4473E-05	1.1209E-05	3.7274E-02
2	1	5.6553E-02	1.8178E-05	3.2661E-05	1.2036E-05	6.4639E-02
2	2	6.1212E-02	1.6229E-05	3.2664E-05	1.1914E-05	6.4169E-02
3	1	6.3403E-02	1.4384E-05	4.1483E-05	1.2041E-05	5.4693E-02
3	2	6.6173E-02	1.0262E-05	4.1088E-05	1.2323E-05	5.0043E-02

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

TEST 123 MU BLANKET HEATED DELTA P TEST

AP = C.125E-02 D = 0.132E-01 L = 0.500E 01 DELTA T0 = 0.500E 01

POINT	P0 - In	P0 - OUT	DATA POINTS		AP	WT BAL.	G
			T0 - In	T0 - OUT			
1	3.0190E 03	2.619E 03	C.050E 01	D.560E 01	2.230E 00	3.033E 01	0.470E 02
2	3.0340E 03	2.733E 03	C.050E 01	1.021E 02	2.240E 00	4.175E 01	1.230E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST 123 MU BLANKET HEATED DELTA P TEST

DATA POINT 1							
STA	P0	T0	T0	T0	Q/A	W	DEL TF
1	2.0590E C3	7.532E 01	0.790E 02	2.512E 02	1.154E 01	6.0451E-02	1.710E 02
2	2.0552E C3	6.424E 01	0.780E 02	2.542E 02	1.050E 01	5.034E-02	2.040E 02
STA	L/D	DELTA E	LE				VS
1	2.300E C1	6.170E 00	1.00CE 00				1.013E 02
2	2.550E C1	4.410E 00	7.500E-01				1.017E 02

LOCAL TEST PARAMETERS

TEST 123 MU BLANKET HEATED DELTA P TEST

DATA POINT 2							
STA	P0	T0	T0	T0	Q/A	W	DEL TF
1	2.0611E C3	9.170E C1	1.03ME 03	3.346E 02	2.115E 01	2.055E 01	0.441E-02
2	2.0759E C3	1.000E C2	1.042E 03	3.952E 02	1.570E 01	1.900E 01	6.730E-02
STA	L/D	DELTA E	LE				VS
1	2.200E C1	6.420E 00	1.00CE 00				2.420E 02
2	2.550E C1	6.110E 00	7.500E-01				2.951E 02

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TEST 123 NO SIGHTS MEASURED DELTA P TEST

DATA POINT	SIA	NU	PR	RE	T1/T0	SPM(±0)
1	1	1-3661E-03	5-9728E-04	2-6388E-05	1-3187E-05	-6-7593E-02
1	2	1-9662E-03	4-9716E-04	2-9778E-05	3-3064E-05	-5-3763E-02
2	1	1-67132E-03	6-9698E-04	3-2181E-05	1-9407E-05	-6-1938E-02
2	2	1-31222E-03	4-1243E-04	3-4388E-05	1-8277E-05	-7-4946E-02

TABLE II
EFFECT OF VARIOUS FLOW RATES ON THE SEDIMENTATION POINT

DRAFTS OF STYLING

TEST 123 AND ELEMENT HEATED DATA P TEST

DATA POINT		STA	MEAN(F)	SD(F)	ME(F)	T1/TF	ME(TF)
1	1	1	1.1956E-03	2.5339E-03	4.0593E-03	1.1374E-03	7.6970E-03
	1	2	0.7020E-02	2.1770E-02	5.3320E-03	1.1614E-03	6.3770E-03
2	1	1	1.4322E-03	1.9139E-03	6.2330E-03	1.1864E-03	1.1693E-03
	2	2	1.1170E-03	1.6239E-03	7.1163E-03	1.2804E-03	9.1677E-03

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

TEST 124: SUMMARY OF DATA POINTS

$\Delta F = 0.204E-03$ $\Delta = 0.10E-01$ $L = 0.000E+01$ $\Delta T_{TU} = 0.000E+00$

DATA POINTS

POINT	PB-IN	PB-OUT	TG-IN	TG-OUT	B	E2	E2	OP	WT. HSL.	6
1	4.11E-03	4.15E-03	1.72E-02	1.93E-02	5.90E-01	6.62E-01	3.88E-01	2.36E-01	3.75E-02	3.75E-02
2	4.117E-03	4.151E-03	1.63E-02	2.06E-02	5.93E-01	1.371E-01	5.23E-02	6.59E-02	-1.343E-01	3.75E-02
3	4.1170E-03	4.146E-03	1.629E-02	2.17E-02	5.94E-01	1.99E-01	1.011E-01	1.731E-01	1.160E-01	3.75E-02
4	4.1173E-03	4.149E-03	1.633E-02	2.26E-02	5.945E-01	2.02E-01	1.12E-01	2.16E-01	4.519E-01	3.75E-02
5	4.11731E-03	4.1491E-03	1.637E-02	2.38E-02	5.949E-01	2.22E-01	1.23E-01	2.59E-01	-7.59E-01	3.75E-02

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 124 CURRENT AT DATA POINT 2

STA	P _U	T ₀	T _B	T _D	DATA POINT 1			Q/A	N	DEL TP	VS
					T ₁	T ₂	T ₃				
1	4.015E-03	1.015E-03	1.015E-03	0.700E-02	0.300E-02	0.300E-02	0.300E-02	0.450E-01	1.000E-01	0.400E-01	0.400E-01
2	4.015E-03	1.015E-03	1.015E-03	2.000E-02	2.000E-02	2.000E-02	2.000E-02	0.180E-01	0.555E-01	0.100E-01	0.100E-01

LOCAL TEST PARAMETERS

TEST 124 CURRENT AT DATA POINT 3

STA	P _U	T ₀	T _B	T _D	DATA POINT 2			Q/A	N	DEL TP	VS
					T ₁	T ₂	T ₃				
1	4.015E-03	2.000E-03	5.000E-02	5.100E-02	3.077E-02	3.077E-02	3.077E-02	0.400E-01	1.000E-02	1.073E-02	0.430E-01
2	4.015E-03	2.000E-03	2.000E-03	5.250E-02	5.250E-02	5.250E-02	5.250E-02	3.490E-01	2.400E-01	1.000E-02	0.430E-01

LOCAL TEST PARAMETERS

TEST 124 CURRENT AT DATA POINT 4

STA	P _U	T ₀	T _B	T _D	DATA POINT 3			Q/A	N	DEL TP	VS
					T ₁	T ₂	T ₃				
1	4.015E-03	2.000E-03	5.000E-02	7.000E-02	4.917E-02	4.917E-02	4.917E-02	0.450E-01	2.000E-02	2.016E-02	0.440E-01
2	4.015E-03	2.000E-03	2.000E-03	7.250E-02	7.250E-02	7.250E-02	7.250E-02	0.912E-01	0.912E-01	2.000E-02	0.440E-01

LOCAL TEST PARAMETERS

TEST 124 CURRENT AT DATA POINT 5

STA	P _U	T ₀	T _B	T _D	DATA POINT 4			Q/A	N	DEL TP	VS
					T ₁	T ₂	T ₃				
1	4.015E-03	2.000E-03	5.000E-02	7.000E-02	3.074E-02	3.074E-02	3.074E-02	0.400E-01	1.000E-02	1.070E-02	0.430E-01
2	4.015E-03	2.000E-03	2.000E-03	7.300E-02	7.300E-02	7.300E-02	7.300E-02	0.912E-01	0.912E-01	2.000E-02	0.440E-01

LOCAL TEST PARAMETERS

TEST 124 CURRENT AT DATA POINT 6

STA	P _U	T ₀	T _B	T _D	DATA POINT 5			Q/A	N	DEL TP	VS
					T ₁	T ₂	T ₃				
1	4.015E-03	2.000E-03	5.000E-02	7.000E-02	3.074E-02	3.074E-02	3.074E-02	0.400E-01	1.000E-02	1.070E-02	0.430E-01
2	4.015E-03	2.000E-03	2.000E-03	7.300E-02	7.300E-02	7.300E-02	7.300E-02	0.912E-01	0.912E-01	2.000E-02	0.440E-01

LOCAL TEST PARAMETERS

TEST 124 CURRENT AT DATA POINT 7

STA	P _U	T ₀	T _B	T _D	DATA POINT 6			Q/A	N	DEL TP	VS
					T ₁	T ₂	T ₃				
1	1.025E-01	5.000E-01	5.000E-01	1.000E-01	4.900E-01	4.900E-01	4.900E-01	1.000E-01	1.000E-01	1.000E-01	1.000E-01
2	1.025E-01	5.000E-01	2.000E-01	1.000E-01	3.030E-01	3.030E-01	3.030E-01	1.000E-01	1.000E-01	1.000E-01	1.000E-01

TEST 124 CURRENT AT DATA POINT 8

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LOCAL TEST PARAMETERS

TEST 124 MARGINAL AT DATA POINT 5

DATA POINT	STA	TEST			TEST			TEST			TEST		
		T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
1	4.0152E-03	2.049E-02	8.092E-02	5.093E-02	1.036E-02	9.035E-02	9.035E-02	2.030E-02	3.021E-02	3.021E-02	2.049E-02	3.050E-02	3.050E-02
2	4.0143E-03	2.035E-02	9.012E-02	5.020E-02	1.020E-02	9.020E-02	9.020E-02	2.010E-02	3.000E-02	3.000E-02	2.030E-02	3.040E-02	3.040E-02
STA	LSD	0.01TA E	LG										
1	1.0291E-01	0.0550E-00	1.000E-00										
2	1.0704E-01	0.0170E-00	7.000E-01										

OBSTACLES/LESS PARAMETERS

TEST 124 MARGINAL AT DATA POINT 5

DATA POINT	STA	MU	PR	ME	T1/T0	MU RATIO
1	1	4.0396E-02	2.0161E-00	1.0037E-00	1.0635E-00	3.3772E-02
1	2	3.0344E-02	2.0160E-00	1.0043E-00	1.0793E-00	2.3790E-02
2	1	3.0324E-02	2.0069E-00	1.0035E-00	1.0264E-00	2.4046E-02
2	2	3.0040E-02	2.0261E-00	1.0020E-00	1.0289E-00	2.2723E-02
3	1	5.0227E-02	1.9875E-00	2.0039E-00	1.0429E-00	3.9716E-02
3	2	4.0770E-02	1.0729E-00	2.0056E-00	1.0022E-01	5.6573E-02
4	1	5.0797E-02	1.0430E-00	2.0056E-00	1.0467E-00	4.4570E-02
4	2	5.0266E-02	1.0450E-00	2.0209E-00	1.0081E-00	4.1116E-02
5	1	5.0820E-02	1.0853E-00	2.0134E-00	1.0504E-00	6.5532E-02
5	2	5.0637E-02	1.0762E-00	2.0230E-00	1.0552E-00	6.4930E-02

DATA POINT	STA	MU RATIO	K RATIO	MU RATIO	CP RATIO
1	1	1.0E-03E-00	9.0000E-01	1.0000E-00	9.0000E-01
1	2	1.0235E-00	9.0050E-01	1.0235E-00	9.0050E-01
2	1	1.0644E-00	9.0492E-01	1.0700E-00	9.0500E-01
2	2	1.08924E-00	9.0536E-01	2.0000E-00	9.0736E-01
3	1	1.1500E-00	9.0866E-01	2.0123E-00	1.0012E-01
3	2	1.1665E-00	1.0000E-00	2.0123E-00	1.0023E-00
4	1	1.1735E-00	1.0150E-00	2.0060E-00	1.0027E-00
4	2	1.1528E-00	1.0442E-00	3.0000E-00	1.0237E-00
5	1	1.2097E-00	1.0749E-00	3.0000E-00	1.0044E-00
5	2	1.2099E-00	1.1117E-00	3.0000E-00	1.0007E-00

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DIMENSIONLESS PARAMETER

TLS 120 CHANNELS AT DATA POINTS

DATA POINT	STA	NU(F)	P(F)	REF(F)	T(F/P)	REF(T)
1	1	4.5134E-02	1.9332E-23	2.8328E-02	1.9332E-02	2.8328E-02
1	2	3.6529E-02	1.9393E-02	2.0067E-02	1.6701E-02	2.0067E-02
1	3	3.1811E-02	1.6449E-02	2.6653E-02	1.1160E-02	2.6779E-02
1	4	2.9163E-02	1.4499E-02	2.7579E-02	1.1200E-02	2.8597E-02
1	5	4.1874E-02	1.1163E-02	3.4247E-02	8.7732E-03	4.4963E-02
1	6	4.3626E-02	1.0363E-02	3.6610E-02	8.6903E-03	4.6481E-02
1	7	3.2623E-02	1.6237E-02	3.4918E-02	1.1694E-02	3.5271E-02
1	8	3.0922E-02	9.7399E-03	3.7272E-02	1.2200E-02	3.7410E-02
1	9	3.0632E-02	9.3600E-03	3.8793E-02	1.2162E-02	3.8848E-02
1	10	3.0223E-02	8.9900E-03	4.0072E-02	1.2160E-02	3.9730E-02

REF(TTLS-A)

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LARGE SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 165 AND SUBSEQUENT HEATED DELTA P TEST

$\Delta t = 0.1202 \times 10^{-3}$ $D = 0.1322 \times 10^{-3}$ $L = 0.2002 \times 10^{-3}$ $DATA_{IN} = DATA_{OUT} = 0$

DATA POINTS

POINT	PR-IN	PR-OUT	TG-IN	TG-OUT	DATA
1	4.139E 03	3.679E 03	6.369E 01	5.648E 01	2.230E 00
2	4.092E 03	3.669E 03	6.356E 01	5.636E 01	2.230E 00
3	3.971E 03	3.649E 03	6.350E 01	5.618E 01	2.230E 00

Report AFML-TR-66-263, Appendix 3

TEST SECTION

LOCAL TEST PARAMETERS

TEST 125 NO ELEMENT HEATED DELTA P TEST

DATA POINT 1

SIA	PB	T ₀	T _{1a}	T _{1b}	Q/A	WAP	W	REL. TP	TP
1	2.6879E C3	7.522E 01	6.336E 02	2.0331E 02	1.074E 01	6.030E 01	6.032E-02	1.032E 02	1.031E 02
2	2.6879E C3	8.3468E 01	6.3460E 02	2.0369E 02	1.061E 01	6.032E 01	7.142E-02	1.032E 02	1.032E 02
SIA	L/D	DELTA E	LE						
1	2.369E C1	2.6527E 01	4.025CE 00						
2	2.955CE C1	4.470E 30	7.599E-01						

LOCAL TEST PARAMETERS

TEST 125 NO ELEMENT HEATED DELTA F TEST

DATA POINT 2

SIA	PB	T ₀	T _{1a}	T _{1b}	Q/A	WAP	W	REL. TP	TP
1	2.6711E C3	9.0122E 01	1.006E 03	3.0159E 02	2.041E 01	6.032E 01	6.032E-02	1.032E 02	1.032E 02
2	2.6711E C3	9.4270E 01	1.007E 03	2.0257E 02	2.031E 01	6.032E 01	6.032E-02	1.032E 02	1.032E 02
SIA	L/D	DELTA E	LE						
1	2.369E C1	3.5176 E 01	4.0250E 00						
2	2.6946E C1	6.159E 01	1.500E-01						

LOCAL TEST PARAMETERS

TEST 125 NO ELEMENT HEATED DELTA P TEST

DATA POINT 3

SIA	PB	T ₀	T _{1a}	T _{1b}	Q/A	WAP	W	REL. TP	TP
1	2.6946E C3	1.0093E 02	1.0305E 03	3.0135E 02	2.042E 01	6.032E 01	7.037E-02	1.032E 02	1.032E 02
2	2.6946E C3	1.0155E 02	1.0301E 03	3.0119E 02	2.036E 01	6.032E 01	7.042E-02	1.032E 02	1.032E 02
SIA	L/D	DELTA E	LE						
1	2.6946E C1	4.011E 01	4.0250E 00						
2	2.6946E C1	7.700E 00	7.000E-01						

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TEST 125 NO BURNOUT HEATED DELTA P TEST

DATA POINT	STA	MU	P(F)	RE	TI/TB	MU/PR(1.4)
1	1	1.3765E 03	5.0757E 00	2.9993E 05	1.2592E 00	7.1877E 02
1	2	1.4299E 03	4.3425E 00	3.1204E 05	1.2713E 00	7.0004E 02
2	1	1.7297E 03	4.4659E 00	3.3693E 05	1.4144E 00	7.3003E 02
2	2	1.7176E 03	4.1705E 00	3.4961E 05	1.4401E 00	7.7013E 02
3	1	1.3627E 03	3.9694E 00	3.6298E 05	1.4731E 00	7.4854E 02
3	2	1.7059E 03	3.6291E 00	3.6867E 05	1.5234E 00	1.6193E 03

DATA POINT	STA	MU RATIO	K RATIO	MU RATIO	CP RATIO
1	1	1.0434E 00	6.2962E-01	2.4405E 00	9.02264E-01
1	2	1.0667E 00	6.3647E-01	2.3584E 00	9.3144E-01
2	1	1.1067E 00	6.2170E-01	3.0632E 00	9.7644E-01
2	2	1.0622E 00	6.3062E-01	2.9932E 00	9.7487E-01
3	1	1.1571E 00	6.6104E-01	4.7220E 00	1.0074E 00
3	2	1.1502E 00	5.5710E-01	3.6131E 00	9.8707E-01

DIMENSIONLESS PARAMETERS

TEST 125 NO BURNOUT HEATED DELTA P TEST

DATA POINT	STA	MU(F)	P(F)	RE(F)	TI/TF	MU/PR(1.4)
1	1	1.02270E 03	2.5591E 00	4.9376E 05	1.1248E 00	8.2483E 02
1	2	1.02615E 03	2.66817E 00	4.9706E 05	1.1194E 00	8.6363E 02
2	1	1.04511E 03	2.0155E 00	6.1311E 05	1.1717E 00	1.1266E 03
2	2	1.04902E 03	1.9478E 00	6.3194E 05	1.1688E 00	1.1414E 03
3	1	1.14905E 03	1.3774E 00	6.2647E 05	1.2512E 00	1.0109E 03
3	2	1.4753E 03	1.5255E 00	7.6120E 05	1.2090E 00	1.2459E 03

Report AFRPL-TR-66-263, Appendix B

**LIQUID SIDE HEAT TRANSFER TEST DATA
OVERALL TEST PARAMETERS**

901 H2O2 TEST 126 BURNOUT AT DATA POINT 8

POINT	DATA POINTS			DATA POINTS			DATA POINTS		
	PB-IN	PB-OUT	TB-IN	PB-OUT	TB-IN	PB-OUT	TB-IN	PB-OUT	TB-IN
1	4.209E-03	3.969E-03	6.210E-01	6.660E-01	1.820E-00	3.037E-01	9.943E-02	2.746E-01	1.327E-00
2	4.203E-03	3.966E-03	6.220E-01	6.670E-01	1.823E-00	3.031E-01	9.299E-02	2.773E-01	1.322E-00
3	4.207E-03	4.034E-03	6.240E-01	6.127E-01	1.827E-00	4.476E-01	8.375E-03	5.834E-01	1.326E-00
4	4.248E-03	4.014E-03	6.260E-01	1.203E-02	1.814E-00	4.790E-01	1.468E-03	6.679E-01	1.316E-00
5	4.242E-03	4.008E-03	6.250E-01	1.250E-02	1.807E-00	4.973E-01	1.516E-03	7.154E-01	1.311E-00
6	4.239E-03	4.005E-03	6.250E-01	1.311E-02	1.804E-00	5.213E-01	1.591E-03	7.863E-01	1.314E-00
7	4.235E-03	4.004E-03	6.250E-01	1.361E-02	1.797E-00	5.377E-01	1.638E-03	8.356E-01	1.304E-00
8	4.235E-03	4.003E-03	6.250E-01	1.419E-02	1.790E-00	5.577E-01	1.764E-03	9.608E-01	1.298E-00

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TEST SECTION

LOCAL TEST PARAMETERS

901 H202 TEST 126 BURNOUT AT DATA POINT 0

DATA POINT 1								
STA	PB	TB	TW	T1	Q/A	H	DEL TF	V3
1	4.029E 03	8.042E 01	6.920E 02	2.669E 02	1.140E 01	1.10E 01	5.936E-02	1.53E 02
2	3.981E 03	8.536E 01	6.970E 02	2.733E 02	1.140E 01	1.10E 01	5.937E-02	1.53E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	3.037E 01	3.000E 00					
2	2.987E 01	3.037E 01	3.000E 00					

LOCAL TEST PARAMETERS

901 H202 TEST 126 BURNOUT AT DATA POINT 0

DATA POINT 2								
STA	PB	TB	TW	T1	Q/A	H	DEL TF	V3
1	4.025E 03	9.332E 01	1.016E 03	3.489E 02	1.972E 01	1.911E 01	7.076E-02	2.53E 02
2	3.978E 03	1.016E 02	1.016E 03	3.531E 02	1.972E 01	1.911E 01	7.076E-02	2.53E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	4.031E 01	5.000E 00					
2	2.987E 01	4.031E 01	5.000E 00					

LOCAL TEST PARAMETERS

901 H202 TEST 126 BURNOUT AT DATA POINT 0

DATA POINT 3								
STA	PB	TB	TW	T1	Q/A	H	DEL TF	V3
1	4.023E 03	1.001E 02	1.003E 03	2.564E 02	2.419E 01	2.334E 01	1.094E-01	1.53E 02
2	4.046E 03	1.102E 02	1.061E 03	2.533E 02	2.420E 01	2.334E 01	1.031E-01	1.53E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	4.476E 01	5.000E 00					
2	2.987E 01	4.476E 01	5.000E 00					

LOCAL TEST PARAMETERS

901 H202 TEST 126 BURNOUT AT DATA POINT 0

DATA POINT 4								
STA	PB	TB	TW	T1	Q/A	H	DEL TF	V3
1	4.072E 03	1.058E 02	1.324E 03	4.766E 02	2.766E 01	2.673E 01	7.323E-02	1.53E 02
2	4.025E 03	1.174E 02	1.312E 03	4.535E 02	2.766E 01	2.673E 01	7.956E-02	1.53E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	4.759E 01	5.000E 00					
2	2.987E 01	4.799E 01	5.000E 00					

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LOCAL TEST PARAMETERS

901 H202 TEST 126 SURGEAT AT DATA POINT 5

DATA POINT 5						
STA	Pg	T _B	T _U	T _I	O/A	O/AP
1	4.007E 03	1.039E 02	1.400E 03	5.169E 02	2.035E 01	2.035E 01
2	4.007E 03	1.021E 02	1.391E 03	4.922E 02	2.035E 01	2.035E 01
STA	L/D	DELTA E	LE			
1	2.350E 01	4.973E 01	5.000E 00			
2	2.007E 01	4.973E 01	5.000E 00			

LOCAL TEST PARAMETERS

901 H202 TEST 126 SURGEAT AT DATA POINT 6

DATA POINT 6						
STA	Pg	T _B	T _U	T _I	O/A	O/AP
1	4.003E 03	1.012E 02	1.501E 03	6.037E 02	3.253E 01	3.147E 01
2	4.017E 03	1.277E 02	1.513E 03	5.633E 02	3.253E 01	3.147E 01
STA	L/D	DELTA E	LE			
1	2.350E 01	5.213E 01	5.000E 00			
2	2.007E 01	5.213E 01	5.000E 00			

LOCAL TEST PARAMETERS

901 H202 TEST 126 SURGEAT AT DATA POINT 7

DATA POINT 7						
STA	Pg	T _B	T _U	T _I	O/A	O/AP
1	4.003E 03	1.017E 02	1.634E 03	6.501E 02	3.451E 01	3.342E 01
2	4.015E 03	1.320E 02	1.623E 03	6.320E 02	3.451E 01	3.342E 01
STA	L/D	DELTA E	LE			
1	2.350E 01	5.377E 01	5.000E 00			
2	2.007E 01	5.377E 01	5.000E 00			

LOCAL TEST PARAMETERS

901 H202 TEST 126 SURGEAT AT DATA POINT 8

DATA POINT 8						
STA	Pg	T _B	T _U	T _I	O/A	O/AP
1	4.003E 03	1.220E 02	1.700E 03	7.435E 02	3.723E 01	3.604E 01
2	4.015E 03	1.373E 02	1.623E 03	6.446E 02	3.723E 01	3.604E 01
STA	L/D	DELTA E	LE			
1	2.350E 01	5.577E 01	5.000E 00			
2	2.007E 01	5.577E 01	5.000E 00			

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

901 H2O2 TEST 127 BURNOUT AT DATA POINT 0

AF = 6.138E-03 D = 6.132E-01 L = 6.666E-01 DELTA VO = 6.17E-01

DATA POINTS

PC1INT	PG-IN	PG-OUT	TB-IN	TB-OUT	V	E2	12	WT %SL.	DP
1	4.117E 03	3.568E 03	6.150E 01	6.240E 01	1.198E 00	2.997E 01	7.676E 02	-2.234E 01	6.679E 03
2	4.111E 03	3.975E 03	6.160E 01	6.057E 02	1.199E 00	3.638E 01	9.458E 02	3.239E 01	6.701E 03
3	4.104E 03	3.570E 03	6.160E 01	6.211E 02	1.197E 00	4.285E 01	1.699E 03	4.444E 01	6.687E 03
4	4.097E 03	3.563E 03	6.160E 01	6.313E 02	1.196E 00	4.659E 01	1.168E 03	5.224E 01	6.573E 03
5	4.090E 03	3.560E 03	6.160E 01	6.404E 02	1.195E 00	4.947E 01	1.257E 03	5.899E 01	6.572E 03
6	4.090E 03	3.555E 03	6.160E 01	6.473E 02	1.196E 00	5.144E 01	1.367E 03	6.376E 01	6.572E 03
7	4.090E 03	3.554E 03	6.160E 01	6.547E 02	1.195E 00	5.345E 01	1.368E 03	6.844E 01	6.572E 03
8	4.090E 02	3.973E 03	6.160E 01	6.568E 02	1.193E 00	5.410E 01	1.370E 03	7.024E 01	6.572E 03

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TEST SECTION

LOCAL TEST PARAMETERS

9CC M2L2 TEST 127 BURNOUT AT DATA POINT C

DATA POINT 1						
STA	P _B	T _B	T _A	T _I	Q/A	DEL TF
1	4.00C5E 03	4.556E 31	5.510E C2	2.599E 02	7.773E 00	1.039E 02
2	3.980E 03	5.111E 01	5.790E C2	2.818E 02	7.745E 00	1.007E 02
STA	L/D	DELTA L	LE			
1	2.567E C1	2.957E 01	6.000E P0			
2	3.616E C1	2.557E 01	6.000E 00			

LOCAL TEST PARAMETERS

9CC M2D2 TEST 127 BURNOUT AT DATA POINT B

DATA POINT 2						
STA	P _B	T _B	T _A	T _I	Q/A	DEL TF
1	4.00C5E 03	9.681E C1	7.370E 02	3.262E 02	1.133E 01	1.037E 02
2	3.581E C3	1.029E 02	7.580E 02	31.527E 02	1.132E 01	0.349E -02
STA	L/D	DELTA E	LE			
1	2.587E C1	3.638E C1	6.000E 00			
2	3.616E C1	3.638E 01	6.000E 00			

LOCAL TEST PARAMETERS

9CC M2C2 TEST 127 BURNOUT AT DATA POINT B

DATA POINT 3						
STA	P _B	T _B	T _A	T _I	Q/A	DEL TF
1	3.654E C3	1.029E C2	9.246E 32	3.530E 02	1.057E 01	1.049E 02
2	3.576E C3	1.016E C2	9.070E 02	9.231E 02	1.055E 01	0.891E -02
STA	L/D	DELTA L	LE			
1	2.587L C1	4.025E 01	6.000E C0			
2	3.616L C1	4.025E C1	6.000E 00			

LOCAL TEST PARAMETERS

9CC M2C2 TEST 127 BURNOUT AT DATA POINT B

DATA POINT 4						
STA	P _B	T _B	T _A	T _I	Q/A	DEL TF
1	3.095E C3	1.029E 02	1.023E 33	4.370E 02	1.024E 01	5.007E -02
2	3.074E C3	1.024E 02	1.064E 33	4.765E 02	1.022E 01	4.971E -02
STA	L/D	DELTA E	LE			
1	2.587L C1	4.025E C1	6.000L 30			
2	3.616L C1	4.025E C1	6.000L 00			

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LOCAL TEST PARAMETERS

901 M2G2 TEST 127 BURNOUT AT DATA POINT 6

DATA POINT 6							
STA	PB	T _B	T _A	T _I	Q/A	Q/AP	H
1	3.936E 03	1.240E 02	1.133E 03	6.793E 02	2.000E 01	1.000E 01	5.000E 02
2	3.936E 03	1.371E 02	1.160E 03	6.043E 02	2.000E 01	1.000E 01	4.000E 02
STA	L/D	DELTA E	LL				
1	2.987E 01	6.947E 01	6.000E 00				
2	3.016E 01	6.947E 01	6.000E 00				

LOCAL TEST PARAMETERS

901 M2G2 TEST 127 BURNOUT AT DATA POINT 6

DATA POINT 6							
STA	PB	T _B	T _A	T _I	Q/A	Q/AP	H
1	2.983E 03	1.294E 02	1.222E 03	6.330E 02	2.000E 01	1.000E 01	5.000E 02
2	3.001E 03	1.437E 02	1.344E 03	6.954E 02	2.000E 01	1.000E 01	5.017E 02
STA	L/D	DELTA E	LL				
1	2.987E 01	6.146E 01	6.000E 00				
2	3.016E 01	6.146E 01	6.000E 00				

LOCAL TEST PARAMETERS

901 M2G2 TEST 127 BURNOUT AT DATA POINT 6

DATA POINT 7							
STA	PB	T _B	T _A	T _I	Q/A	Q/AP	H
1	3.932E 03	1.233E 02	1.322E 03	6.161E 02	2.000E 01	1.000E 01	5.000E 02
2	3.932E 03	1.569E 02	1.548E 03	6.010E 02	2.000E 01	1.000E 01	5.000E 02
STA	L/D	DELTA E	LL				
1	2.987E 01	5.398E 01	6.000E 00				
2	3.016E 01	5.398E 01	6.000E 00				

LOCAL TEST PARAMETERS

901 M2G2 TEST 127 BURNOUT AT DATA POINT 6

DATA POINT 8							
STA	PB	T _B	T _A	T _I	Q/A	Q/AP	H
1	3.932E 03	1.370E 02	1.133E 03	6.011E 02	2.000E 01	1.000E 01	5.000E 02
2	3.932E 03	1.528E 02	1.540E 03	9.234E 02	2.000E 01	1.000E 01	7.700E 02
STA	L/D	DELTA E	LL				
1	2.987E 01	5.410E 01	6.000E 00				
2	3.016E 01	5.410E 01	6.000E 00				

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

SCI #202 TEST 120 BURNOUT AT DATA POINT ?

AF = 0.273E-03 D = 0.212E-01 L = 0.500E-01 DELTA T₀ = 0.900E-08

DATA POINTS

FCINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	L ₂	L ₂	DP	DP
1	0.158E 02	0.149E 03	1.144E 02	1.210E 02	1.164E 00	0.578E 00	0.480E 02	3.992E 00	3.220E 03
2	0.153E 03	0.130E 03	1.145E 02	1.409E 02	1.164E 00	2.020E 01	0.146E 02	1.757E 01	1.000E 03
3	0.150E 03	0.134E 03	1.143E 02	1.499E 02	1.164E 00	2.427E 01	1.860E 02	2.490E 01	1.173E 03
4	0.147E 03	0.130E 03	1.140E 02	1.610E 02	1.143E 00	2.429E 01	1.253E 02	3.352E 01	1.374E 03
5	0.145E 03	0.124E 03	1.106E 02	1.691E 02	1.010E 00	3.020E 01	1.537E 03	2.630E 01	1.772E 03
6	0.142E 03	0.124E 03	1.140E 02	1.733E 02	1.144E 00	3.130E 01	1.381E 03	4.160E 01	4.477E 03
7	0.142E 03	0.125E 03	1.142E 02	1.740E 02	1.130E 00	3.159E 01	1.365E 03	4.134E 01	4.000E 03

TEST SECTION

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LOCAL TEST PARAMETERS

901 M2C2 TEST 126 CUMACUT AT DATA POINT 7

DATA PT. 6

STA	PB	T ₀	T ₀	T ₀	T ₁	O/A	O/AP	N	DEL. T _P	V _S
1	4.181E C3	1.184E 92	2.050E 02	2.109E 01	1.113E 00	1.130E 00	1.248E 00	1.140E 01	1.032E 02	1.032E 01
2	4.145E C3	1.227E 92	2.047E 02	1.504E 02	1.113E 00	1.130E 00	1.493E 00	7.773E 01	1.032E 02	1.032E 01
STA	L/D	DELTA E	LS							
1	1.047E C1	9.570E 00	5.000E 00							
2	1.047E C1	9.570E 00	5.000E 00							

LOCAL TEST PARAMETERS

901 M2C2 TEST 126 CUMACUT AT DATA POINT 7

DATA PT. 2

STA	PB	T ₀	T ₀	T ₀	T ₁	O/A	O/AP	N	DEL. T _P	V _S
1	4.140E C3	1.026E 02	6.348E 02	9.021E 02	9.000E 00	9.000E 00	1.520E 00	1.043E 02	2.282E 02	1.032E 01
2	4.137E C3	1.027E 02	6.180E 02	9.309E 02	9.000E 00	9.000E 00	1.663E 00	2.000E 02	2.000E 02	1.032E 01
STA	L/D	DELTA E	LS							
1	1.047E C1	2.050E 01	5.000E 00							
2	1.047E C1	2.050E 01	5.000E 00							

LOCAL TEST PARAMETERS

901 M2C2 TEST 126 CUMACUT AT DATA POINT 7

DATA PT. 3

STA	PB	T ₀	T ₀	T ₀	T ₁	O/A	O/AP	N	DEL. T _P	V _S
1	4.143E 03	1.010E 02	9.090E 02	9.793E 02	9.033E 00	9.033E 00	1.621E 00	1.021E 02	4.375E 02	1.032E 01
2	4.134E 03	1.021E 02	7.920E 02	5.295E 02	6.301E 00	7.604E 00	1.724E 00	1.724E 02	4.114E 02	1.032E 01
STA	L/D	DELTA E	LS							
1	1.047E C1	6.027E 01	5.000E 00							
2	1.047E C1	2.0427E 01	5.000E 00							

LOCAL TEST PARAMETERS

901 M2C2 TEST 126 CUMACUT AT DATA POINT 7

DATA PT. 4

STA	PB	T ₀	T ₀	T ₀	T ₁	O/A	O/AP	N	DEL. T _P	V _S
1	4.129E 03	1.050E 02	5.000E 02	6.430E 02	9.311E 00	9.320E 00	1.754E 00	1.034E 02	5.431E 02	1.032E 01
2	4.131E 03	1.055E 02	9.030E 02	9.090E 02	9.320E 00	9.320E 00	1.800E 00	5.000E 02	5.000E 02	5.000E 01
STA	L/D	DELTA E	LS							
1	1.047E C1	2.0426E 01	5.000E 00							
2	1.047E C1	2.0424E 01	5.000E 00							

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LOCAL TEST PARAMETERS

901 M2C2 TEST 1₂₃ MIMENT AT DATA POINT 7

		DATA POINT 5							
		PB	TB	TG	TI	QA	W/A	DEL. TP	DEL. W
STA	1	4.0120E 03	1.0552E 02	1.0681E 03	7.5244E 02	1.007E 01	1.091E 01	1.009E-02	1.009E 02
	2	4.0129E 03	1.0563E 02	1.0693E 03	7.519E 02	1.036E 01	1.091E 01	1.024E-02	1.024E 02
STA	L/D	DELT A E	LG						
	1	1.0476E C1	3.0294E 01	5.000E 00					
STA	2	1.0470E C1	3.0299E 01	5.000E 00					

LOCAL TEST PARAMETERS

901 M2C2 TEST 1₂₄ MIMENT AT DATA POINT 7

		DATA POINT 6							
		PB	TB	TG	TI	QA	W/A	DEL. TP	DEL. W
STA	1	4.0120E 03	1.0565E 02	1.0620E 03	7.5176E 02	1.043E 01	1.070E 01	1.055E-02	1.055E 02
	2	4.0127E 03	1.0573E 02	1.0623E 03	7.5022E 02	1.014E 01	1.070E 01	1.044E-02	1.044E 02
STA	L/D	DELT A E	LG						
	1	1.0476E C1	3.0128E 01	5.000E 00					
STA	2	1.0470E C1	3.0129E 01	5.000E 00					

LOCAL TEST PARAMETERS

901 M2C2 TEST 1₂₅ MIMENT AT DATA POINT 7

		DATA POINT 7							
		PB	TB	TG	TI	QA	W/A	DEL. TP	DEL. W
STA	1	4.0125E 03	1.0590E 02	1.0485E 03	7.5224E 02	1.015E 01	1.070E 01	1.053E-02	1.053E 02
	2	4.0125L 03	1.0510E 02	1.0125E 03	7.5113E 02	1.052E 01	1.070E 01	1.023E-02	1.023E 02
STA	L/D	DELT A L	LG						
	1	1.0476E C1	3.0150E 01	5.000E 00					
STA	2	1.0470E C1	3.0150t C1	5.000t C0					

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

901 H2O2 TEST 129 MOUNTED AT DATA POINT 0

$\Delta F = 9.273E-03$ $O = 0.212E-01$ $L = 0.400E-01$

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	Q	E2	Q2	W2	Q3	W3	Q4
1	4.012E 03	3.997E 03	1.037E 02	1.034E 02	9.691E-01	6e-002	0.0	0.740E 02	1.2	6.502E 02	1.502E 02	6.502E 02
2	4.003E 03	3.994E 03	1.038E 02	1.037E 02	9.701E-01	1.417E 01	7.530E 02	0.1	1.012E 01	1.412E 01	5.402E 01	1.412E 01
3	4.007E 03	3.992E 03	1.034E 02	2.017E 02	9.702E-01	1.822E 01	9.380E 02	0.1	1.822E 01	1.822E 01	2.807E 01	1.822E 01
4	4.005E 03	3.993E 03	1.031E 02	2.023E 02	9.697E-01	2.013E 01	1.638E 01	0.5	2.007E 01	2.013E 01	2.804E 01	2.013E 01
5	3.986E 03	3.963E 03	1.030E 02	1.992E 02	9.724E-01	2.220E 01	1.199E 01	0.5	2.044E 01	2.199E 01	2.805E 01	2.199E 01
6	3.978E 03	3.956E 03	1.034E 02	1.971E 02	9.723E-01	2.350E 01	1.219E 01	0.5	2.074E 01	2.193E 01	2.807E 01	2.193E 01
7	3.992E 03	3.977E 03	1.034E 02	2.020E 02	9.693E-01	2.430E 01	1.242E 01	0.5	2.114E 01	2.430E 01	2.810E 01	2.430E 01
8	3.979E 03	3.964E 03	1.034E 02	2.050E 02	9.544E-01	2.477E 01	1.200E 01	0.5	2.160E 01	2.477E 01	2.812E 01	2.477E 01

TEST SECTION

LOCAL TEST PARAMETER

SET MODE TEST 129 BURNOUT AT DATA POINT 0

DATA POINT 1									
STA	Pg	T ₀	T _B	T _E	T _I	T _A	G/A	N	SH. T _P
1	4.0032E-03	1.0000E-02	2.77E-02	2.37E-02	0.29E-01	0.70E-01	2.03E-02	0.30E-01	4.31E-01
2	3.9932E-03	1.0000E-02	2.61E-02	2.21E-02	0.21E-01	0.70E-01	2.00E-02	0.31E-01	4.32E-01
STA	L/D	DATA E	L.E						
1	1.0032E-01	0.90E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02
2	1.0170E-01	0.9000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02

LOCAL TEST PARAMETER

SET MODE TEST 129 BURNOUT AT DATA POINT 3

DATA POINT 2									
STA	Pg	T ₀	T _B	T _E	T _I	T _A	G/A	N	SH. T _P
1	3.0032E-03	2.0000E-02	0.90E-02	0.80E-02	0.70E-02	0.70E-02	2.00E-02	1.077E-02	4.31E-01
2	3.0032E-03	2.0000E-02	0.70E-02	0.60E-02	0.50E-02	0.50E-02	2.00E-02	1.070E-02	4.32E-01
STA	L/D	DATA E	L.E						
1	1.0032E-01	1.0017E-01	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02
2	1.0170E-01	1.0017E-01	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02

LOCAL TEST PARAMETER

SET MODE TEST 129 BURNOUT AT DATA POINT 5

DATA POINT 3									
STA	Pg	T ₀	T _B	T _E	T _I	T _A	G/A	N	SH. T _P
1	3.0032E-03	2.0000E-02	0.61E-02	0.42E-02	0.18E-02	0.18E-02	2.00E-02	0.32E-02	4.31E-01
2	3.0032E-03	2.0000E-02	0.37E-02	0.15E-02	0.10E-02	0.10E-02	2.00E-02	0.30E-02	4.32E-01
STA	L/D	DATA E	L.E						
1	1.0032E-01	1.0032E-01	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02
2	1.0170E-01	1.0032E-01	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02

LOCAL TEST PARAMETER

SET MODE TEST 129 BURNOUT AT DATA POINT 6

DATA POINT 4									
STA	Pg	T ₀	T _B	T _E	T _I	T _A	G/A	N	SH. T _P
1	3.0032E-03	2.13E-02	0.40E-02	0.28E-02	0.10E-02	0.10E-02	2.00E-02	7.127E-02	4.31E-01
2	3.0032E-03	2.21E-02	0.17E-02	0.10E-02	0.10E-02	0.10E-02	2.00E-02	7.127E-02	4.32E-01
STA	L/D	DATA E	L.E						
1	1.0032E-01	2.01E-01	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02	0.00E-02
2	1.0170E-01	2.01E-01	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02	0.0000E-02

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LOCAL TEST PARAMETERS

901 H202 TEST 129 BURNOUT AT DATA POINT 5

DATA POINT 5							
STA	PB	T _B	T _N	T _I	Q/A	Q/AP	H
1	2.970E 03	1.805E 02	7.960E 02	4.053E 02	9.124E 00	8.047E 00	2.056E-02
2	3.966E 03	1.900E 02	7.730E 02	4.582E 02	9.135E 00	8.047E 00	3.239E-02
STA	L/D	DELTA E	LE				
1	1.083E 01	2.026E 01	4.000E 00				
2	1.476E 01	2.026E 01	4.000E 00				

LOCAL TEST PARAMETERS

901 H202 TEST 129 BURNOUT AT DATA POINT 6

DATA POINT 6							
STA	PB	T _B	T _N	T _I	Q/A	Q/AP	H
1	3.968E 03	1.037E 02	8.425E 02	5.054E 02	1.005E 01	9.505E 00	2.974E-02
2	3.964E 03	1.244E 02	8.130E 02	4.703E 02	1.006E 01	9.505E 00	3.443E-02
STA	L/D	DELTA E	LE				
1	1.083E 01	2.339E 01	4.000E 00				
2	1.476E 01	2.339E 01	4.000E 00				

LOCAL TEST PARAMETERS

901 H202 TEST 129 BURNOUT AT DATA POINT 3

DATA POINT 7							
STA	PB	T _B	T _N	T _I	Q/A	Q/AP	H
1	3.982E 03	1.076E 02	8.930E 02	5.347E 02	1.087E 01	1.035E 01	2.942E-02
2	3.978E 03	1.994E 02	8.695E 02	5.066E 02	1.088E 01	1.035E 01	3.373E-02
STA	L/D	DELTA E	LE				
1	1.083E 01	2.436E 01	4.000E 00				
2	1.476E 01	2.436E 01	4.000E 00				

LOCAL TEST PARAMETERS

901 H202 TEST 129 BURNOUT AT DATA POINT 2

DATA POINT 8							
STA	PB	T _B	T _N	T _I	Q/A	Q/AP	H
1	3.969E 03	1.892E 02	9.115E 02	5.436E 02	1.123E 01	1.068E 01	3.012E-02
2	3.965E 03	2.016E 02	9.000E 02	5.298E 02	1.124E 01	1.068E 01	3.255E-02
STA	L/D	DELTA E	LE				
1	1.083E 01	2.477E 01	4.000E 00				
2	1.476E 01	2.477E 01	4.000E 00				

LOCAL TEST PARAMETERS

901 H202 TEST 129 BURNOUT AT DATA POINT 0

DATA POINT 9							
STA	PB	T _B	T _N	T _I	Q/A	Q/AP	H
1	3.969E 03	1.892E 02	9.115E 02	5.436E 02	1.123E 01	1.068E 01	3.012E-02
2	3.965E 03	2.016E 02	9.000E 02	5.298E 02	1.124E 01	1.068E 01	3.255E-02
STA	L/D	DELTA E	LE				
1	1.083E 01	2.477E 01	4.000E 00				
2	1.476E 01	2.477E 01	4.000E 00				

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 130. DURATION TEST. DATA POINTS AT 20 SEC INT. DP10-145SEC.DP10 IS .

Af = 0.138E-03 C = 0.132E-01 L = -0.400E 01 DELTA T0 = 0.230E 01

DATA POINTS

FCNT	PB-IN	PE-CLT	TL-IN	TL-OUT	N	E2	I2	QP	HT BAL.	G
1	3.515E 03	3.285E 03	8.100E-01	1.298E 02	1.785E 00	3.032E 01	1.497E 03	5.438E 01	2.466E 00	1.295E 01
2	3.675E 03	3.440E 03	6.08CE C1	1.304E 02	1.823E 00	3.893E 01	1.516E 03	5.595E 01	1.507E 00	1.322E 01
3	3.674E 03	3.450E 03	6.040E 01	1.313E 02	1.833E 00	3.901E 01	1.519E 03	5.617E 01	1.351E 00	1.338E 01
4	3.630E 03	3.400E 03	6.050E 01	1.315E 02	1.817E 00	3.910E 01	1.514E 03	5.612E 01	1.346E-01	1.319E 01
5	3.625E 03	3.395E 03	6.090E 01	1.308E 02	1.820E 00	3.868E 01	1.495E 03	5.482E 01	-9.972E-01	1.321E 01
6	3.665E 03	3.430E 03	6.04CE 01	1.310E 02	1.827E 00	3.869E 01	1.497E 03	5.491E 01	-2.710E 00	1.326E 01
7	3.645E 03	3.410E 03	6.060E 01	1.322E 02	1.805E 00	3.872E 01	1.497E 03	5.495E 01	-3.594E 00	1.310E 01
8	3.635E 03	3.405E 03	6.070E 01	1.341E 02	1.805E 00	3.901E 01	1.506E 03	5.569E 01	-5.871E 00	1.310F 01
9	3.575E 03	3.340E 03	6.060E 01	1.351E 02	1.762E 00	3.899E 01	1.504F 03	5.546E 01	-7.224E 00	1.293E 01
10	3.500E 03	3.275E 03	6.130E 01	1.365E 02	1.756E 00	3.883E 01	1.503E 03	5.540E 01	-7.222E 00	1.274E 01

TEST SECTION

LOCAL TEST PARAMETERS

TEST 130. DURATIL TEST. DATA POINTS AT 20 SEC INT.DP1-145SEC.DP10 IS 80

DATA POINT 1									
STA	Pd	Td	Tb	Ta	Tl	Q/A	Q/AP	H	DEL TF
1	3.357E C3	1.145E C4	1.285E 03	4.530E 02	2.709E 01	2.72E 01	6.66E-02	3.30E-02	1.474E 02
2	3.247E C3	1.267E 02	1.236E 03	3.612E 02	2.709E 01	2.72E 01	1.663E-01	2.645E 02	1.482E 02
STA	L/D	DELTA E	LE						
1	1.732E C1	3.632E C1	4.000E 00						
2	2.359E C1	3.632E 01	4.000E 00						

LOCAL TEST PARAMETERS

TEST 130. DURATIL TEST. DATA POINTS AT 20 SEC INT.DP1-145SEC.DP10 IS 80

DATA POINT 2									
STA	Pd	Td	Tb	Ta	Tl	Q/A	Q/AP	H	DEL TF
1	3.613E C3	1.149E 02	1.336E 03	4.545E 02	2.793E 01	2.800E 01	7.376E-02	3.70E-02	1.364E 02
2	3.455E C3	1.273E 02	1.263E 03	3.832E 02	2.777E 01	2.800E 01	1.094E-01	2.954E 02	1.514E 02
STA	L/D	DELTA E	LE						
1	1.730E C1	2.653E C1	4.000E 00						
2	2.358E C1	3.632E 01	4.000E 00						

LOCAL TEST PARAMETERS

TEST 130. DURATIL TEST. DATA POINTS AT 20 SEC INT.DP1-145SEC.DP10 IS 80

DATA POINT 3									
STA	Pd	Td	Tb	Ta	Tl	Q/A	Q/AP	H	DEL TF
1	3.525E C3	1.150E 02	1.312E 03	4.555E 02	2.935E 01	2.811E 01	8.264E-02	3.401E-02	1.514E 02
2	3.465E C3	1.281E 02	1.275E 03	4.031E 02	2.807E 01	2.811E 01	1.030E-01	2.730E 02	1.522E 02
STA	L/C	DELTA E	LE						
1	1.730E C1	3.901E C1	4.000E 00						
2	2.359E C1	3.901E 01	4.000E 00						

LOCAL TEST PARAMETERS

TEST 130. DURATIL TEST. DATA POINTS AT 20 SEC INT.DP1-145SEC.DP10 IS 80

DATA POINT 4									
STA	Pd	Td	Tb	Ta	Tl	Q/A	Q/AP	H	DEL TF
1	3.472E C2	1.150E 02	1.306E 03	4.419E 02	2.813E 01	2.808E 01	8.608E-02	3.264E 02	1.501E 02
2	3.414E C3	1.283E 02	1.278E 03	4.006E 02	2.820E 01	2.808E 01	1.031E-01	2.723E 02	1.500E 02
STA	L/C	DELTA E	LE						
1	1.730E C1	3.910E C1	4.000E 00						
2	2.358E C1	3.910E 01	4.000E 00						

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LCCAL TEST PARAMETERS

TEST 130. DURATLIA TEST. DATA POINTS AT 20 SEC INT. DP1-145SEC. DP10 IS 60

DATA POINT 5

STA	Pu	T _b	T _a	T _b	T _a	Q/A	Q/AP	H	DEL TF	V5
1	3.040E-05	1.015E-02	1.034E-03	5.013E-02	2.075E-01	2.743E-01	6.094E-02	3.075E-02	1.503E-02	
2	3.040E-05	1.027E-02	1.025E-03	3.025E-02	2.076E-01	2.743E-01	1.024E-01	2.079E-02	1.511E-02	
STA	L/D	DELTA E	LE							
1	1.0730E	C1	3.000E-01	4.000E-00						
2	2.0358E	C1	3.000E-01	4.000E-00						

LCCAL TEST PARAMETERS

TEST 130. DURATLIA TEST. DATA POINTS AT 20 SEC INT. DP1-145SEC. DP10 IS 80

DATA POINT 6

STA	Pu	T _b	T _a	T _b	T _a	Q/A	Q/AP	H	DEL TF	V5
1	3.0403E-05	1.0152E-02	1.0380E-03	5.0689E-02	2.0757E-01	2.747E-01	6.055E-02	4.038E-02	1.509E-02	
2	3.0403E-05	1.0230E-02	1.0253E-03	3.0591E-02	2.0761E-01	2.747E-01	1.052E-01	2.0613E-02	1.517E-02	
STA	L/D	DELTA E	LE							
1	1.0730E	C1	3.0659E-01	4.0000E-00						
2	2.0358E	C1	3.0659E-01	4.0000E-00						

LUCAL TEST PARAMETERS

TEST 130. DURATLIA TEST. DATA POINTS AT 20 SEC INT. DP1-145SEC. DP10 IS 80

DATA POINT 7

STA	Pu	T _b	T _a	T _b	T _a	Q/A	Q/AP	H	DEL TF	V5
1	3.0403E-05	1.0161E-02	1.0412E-03	5.0116E-02	2.0764E-01	2.750E-01	5.046E-02	4.057E-02	1.493E-02	
2	3.0403E-05	1.0290E-02	1.0278E-03	4.0214E-02	2.0766E-01	2.750E-01	9.401E-02	2.0923E-02	1.500E-02	
STA	L/D	DELTA E	LE							
1	1.0730E	C1	3.0832E-01	4.0000E-00						
2	2.0358E	C1	3.0832E-01	4.0000E-00						

LCCAL TEST PARAMETERS

TEST 130. DURATLIA TEST. DATA POINTS AT 20 SEC INT. DP1-145SEC. DP10 IS 80

DATA POINT 8

STA	Pu	T _b	T _a	T _b	T _a	Q/A	Q/AP	H	DEL TF	V5
1	3.0407E-05	C3	1.0174E-02	1.0452E-03	5.0277E-02	2.0803E-01	2.787E-01	5.0207E-02	4.0352E-02	1.492E-02
2	3.0415E-05	C3	1.0305E-02	1.0285E-03	4.0174E-02	2.0807E-01	2.787E-01	9.722E-02	2.0067E-02	1.501E-02
STA	L/D	DELTA E	LE							
1	1.0730E	C1	3.0901E-01	4.0000E-00						
2	2.0358E	C1	3.0901E-01	4.0000E-00						

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LOCAL TEST PARAMETERS

TEST 130. DURATION TEST. DATA POINTS AT 20 SEC INT. DP1=145SEC, DP10 IS 60

DATA POINT 9								
STA	PB	T _B	T _V	T _I	G/A	D/A	N	DEL T/P
1	3.413E 03	1.181E 02	1.456E 03	6.034E 22	2.787E 01	5.077E 01	5.454E 02	1.474E 02
2	3.353E 03	1.317E 02	1.293E 03	4.293E 02	2.791E 01	2.772E 01	6.322E 02	1.463E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.888E 01	4.000E 00					
2	2.350E 01	3.890E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 130. DURATION TEST. DATA POINTS AT 20 SEC INT. DP1=145SEC, DP10 IS 60

DATA POINT 10								
STA	PB	T _B	T _V	T _I	G/A	D/A	N	DEL T/P
1	3.345E 03	1.192E 02	1.462E 03	6.726E 02	2.789E 01	2.772E 01	5.018E 02	5.533E 02
2	3.269E 03	1.330E 02	1.310E 03	4.594E 02	2.787E 01	2.772E 01	6.459E 02	5.268E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.888E 01	4.000E 00					
2	2.350E 01	3.888E 01	4.000E 00					

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Liquid Side Heat Transfer Test Data

Overall Test Parameters

TEST 132.2 MIN STEADY POWER.DP1-146 SEC.20 SEC INTERVAL.%P IN /ATMATED

AF = 0.146E-03 D = 0.133E-01 L = 0.560E 01

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	E2	12	DP	WT GAN.	%
1	3.640E 03	3.499E 03	8.251E 01	1.291E 02	1.010E 00	0.194E 01	0.114E 03	1.300E 00	1.297E 00	
2	3.639E 03	3.473E 03	8.273E 01	1.296E 02	1.004E 00	0.163E 01	0.121E 03	1.300E 00	1.298E 00	
3	3.625E 03	3.476E 03	8.276E 01	1.296E 02	1.010E 00	0.150E 01	0.121E 03	1.300E 00	1.297E 00	
4	3.546E 03	3.380E 03	8.276E 01	1.291E 02	1.016E 00	0.121E 01	0.104E 03	1.300E 00	1.273E 00	
5	3.389E 03	3.223E 03	8.246E 01	1.282E 02	1.015E 00	0.116E 01	0.277E 03	1.300E 00	1.300E 00	
6	3.255E 03	3.100E 03	8.378E 01	1.294E 02	1.015E 00	0.114E 01	0.274E 03	1.300E 00	1.301E 00	
7	3.166E 03	3.069E 03	9.200E 01	1.373E 02	1.004E 00	0.121E 01	0.270E 03	1.300E 00	1.299E 00	

TEST SECTION

LOCAL TEST PARAMETERS

TEST 132+2 MIN STEADY POWER-OP1-146 SEC-20 SEC INTERVALS-PIN ESTIMATED

DATA POINT 1									
STA	PIN	T0	T1	0/A	0/AP	H	0/TP	02	V2
1	3.542E 03	1.174E 02	9.940E 02	3.240E 02	2.032E 01	0.030E 01	0.030E 02	1.077E 02	1.077E 02
2	3.493E 03	1.268E 02	1.042E 03	4.194E 02	2.020E 01	2.030E 01	0.030E 02	1.063E 02	1.063E 02
STA	L/D	DELTA E	LE						
1	2.344E 01	4.158E 01	5.668E 00						
2	2.569E 01	4.158E 01	5.668E 00						

LOCAL TEST PARAMETERS

TEST 132+2 MIN STEADY POWER-OP1-146 SEC-20 SEC INTERVALS-PIN ESTIMATED

DATA POINT 2									
STA	PIN	T0	T1	0/A	0/AP	H	0/TP	02	V2
1	3.632E 03	1.178E 02	9.542E 02	2.641E 02	2.031E 01	2.037E 01	1.393E 01	1.045E 02	1.077E 02
2	3.484E 03	1.273E 02	1.072E 03	4.308E 02	2.020E 01	2.037E 01	0.729E 02	3.077E 02	1.063E 02
STA	L/D	DELTA E	LE						
1	2.344E 01	4.162E 01	5.668E 00						
2	2.569E 01	4.162E 01	5.668E 00						

LOCAL TEST PARAMETERS

TEST 132+2 MIN STEADY POWER-OP1-146 SEC-20 SEC INTERVALS-PIN ESTIMATED

DATA POINT 3									
STA	PIN	T0	T1	0/A	0/AP	H	0/TP	02	V2
1	3.520E 03	1.174E 02	5.458E 02	2.555E 02	2.021E 01	2.030E 01	1.445E 01	1.384E 02	1.077E 02
2	3.481E 03	1.267E 02	1.044E 03	3.998E 02	2.019E 01	2.030E 01	7.423E 02	2.721E 02	1.063E 02
STA	L/D	DELTA E	LE						
1	2.344E 01	4.158E 01	5.668E 00						
2	2.569E 01	4.158E 01	5.668E 00						

LOCAL TEST PARAMETERS

TEST 132+2 MIN STEADY POWER-OP1-146 SEC-20 SEC INTERVALS-PIN ESTIMATED

DATA POINT 4									
STA	PIN	T0	T1	0/A	0/AP	H	0/TP	02	V2
1	3.492E 03	1.175E 02	9.360E 02	2.548E 02	1.993E 01	1.997E 01	1.4877E 01	1.350E 02	1.077E 02
2	3.394E 03	1.246E 02	1.034E 03	3.674E 02	1.987E 01	1.990E 01	7.468E 02	2.667E 02	1.063E 02
STA	L/D	DELTA E	LE						
1	2.344E 01	4.121E 01	5.668E 00						
2	2.569E 01	4.121E 01	5.668E 00						

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LOCAL TEST PARAMETERS

TEST 132.2 MIN STEADY POWER,DP1-146 SEC,20 SEC INTERVALS,PIN ESTIMATED

STA	PB	T _B	T _A	DATA POINT 5				H	GRL, TP	V _D
				T ₁	G/A	G/AP	G/A			
1	3.287E 03	1.167E 02	9.319E 02	2.492E 02	1.999E 01	1.999E 01	1.999E 01	1.099E-01	1.234E-02	1.091E-02
2	3.241E 03	1.259E 02	1.019E 03	3.741E 02	1.993E 01	1.993E 01	1.993E 01	7.099E-02	2.443E-02	1.047E-02

LOCAL TEST PARAMETERS

TEST 132.2 MIN STEADY POWER,DP1-146 SEC,20 SEC INTERVALS,PIN ESTIMATED

STA	PB	T _B	T _A	DATA POINT 6				H	GRL, TP	V _D
				T ₁	G/A	G/AP	G/A			
1	3.157E 03	1.189E 02	9.276E 02	2.442E 02	1.997E 01	1.999E 01	1.999E 01	1.073E-01	1.234E-02	1.044E-02
2	3.111E 03	1.271E 02	1.018E 03	3.738E 02	1.981E 01	1.981E 01	1.981E 01	6.098E-02	2.444E-02	1.047E-02

LOCAL TEST PARAMETERS

TEST 132.2 MIN STEADY POWER,DP1-146 SEC,20 SEC INTERVALS,PIN ESTIMATED

STA	PB	T _B	T _A	DATA POINT 7				H	GRL, TP	V _D
				T ₁	G/A	G/AP	G/A			
1	3.062E 03	1.243E 02	9.360E 02	2.457E 02	1.994E 01	1.994E 01	1.994E 01	1.064E-01	1.194E-02	1.044E-02
2	3.016E 03	1.356E 02	1.024E 03	3.792E 02	1.997E 01	1.997E 01	1.997E 01	6.015E-02	2.457E-02	1.047E-02

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LITERACY SKILLS ACROSS THE CURRICULUM

OBSERVATIONAL PERSPECTIVES

TEST 1986 • MUSEUM STREET 1001 AT 102 SEE OTHERS AT 104 SEE STEWART STEVENS

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DATA SOURCES

16301E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST 133A + MIN STEADY POWER DPL AT 192 SEC OTHER SP AT 49 SEC INTERVALS

STA	P _D	DATA POINT 1			G/A	G/AP	H	GDL TP	V _D
		T ₀	T ₁	T ₂					
1	3.514E-03	1.034E-02	1.034E-03	1.034E-02	3.264E-02	2.030E-01	2.031E-01	0.0302-02	1.034E-02
2	3.478E-03	1.017E-02	1.033E-03	1.034E-02	3.344E-02	2.030E-01	2.031E-01	0.0302-02	1.033E-02
STA	L/D	DELTA E	LE						
1	1.748E-01	2.314E-01	4.032E-00						
2	2.377E-01	2.314E-01	4.032E-00						

LOCAL TEST PARAMETERS

TEST 133A + MIN STEADY POWER DPL AT 192 SEC OTHER SP AT 49 SEC INTERVALS

STA	P _D	DATA POINT 2			G/A	G/AP	H	GDL TP	V _D
		T ₀	T ₁	T ₂					
1	3.509E-03	1.070E-02	1.037E-03	1.037E-02	3.301E-02	2.030E-01	2.032E-01	0.0302-02	1.037E-02
2	3.467E-03	1.174E-02	1.017E-03	1.037E-02	3.158E-02	2.030E-01	2.032E-01	0.0302-02	1.037E-02
STA	L/D	DELTA E	LE						
1	1.748E-01	2.314E-01	4.032E-00						
2	2.377E-01	2.314E-01	4.032E-00						

LOCAL TEST PARAMETERS

TEST 133A + MIN STEADY POWER DPL AT 192 SEC OTHER SP AT 49 SEC INTERVALS

STA	P _D	DATA POINT 3			G/A	G/AP	H	GDL TP	V _D
		T ₀	T ₁	T ₂					
1	3.498E-03	1.061E-02	1.034E-03	1.034E-02	3.258E-02	2.030E-01	2.032E-01	0.0302-02	1.034E-02
2	3.454E-03	1.177E-02	1.017E-03	1.034E-02	3.057E-02	2.030E-01	2.032E-01	0.0302-02	1.034E-02
STA	L/D	DELTA E	LE						
1	1.748E-01	2.314E-01	4.032E-00						
2	2.377E-01	2.314E-01	4.032E-00						

LOCAL TEST PARAMETERS

TEST 133A + MIN STEADY POWER DPL AT 192 SEC OTHER SP AT 49 SEC INTERVALS

STA	P _D	DATA POINT 4			G/A	G/AP	H	GDL TP	V _D
		T ₀	T ₁	T ₂					
1	3.493E-03	1.077E-02	1.034E-03	1.034E-02	3.258E-02	2.030E-01	2.032E-01	0.0302-02	1.034E-02
2	3.459E-03	1.173E-02	1.017E-03	1.034E-02	3.160E-02	2.030E-01	2.032E-01	0.0302-02	1.034E-02
STA	L/D	DELTA E	LE						
1	1.748E-01	2.323E-01	4.032E-00						
2	2.377E-01	2.323E-01	4.032E-00						

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LOCAL TEST PARAMETERS

TEST 122A + MIN STATION POWER OP1 AT 102 SEC OTHER OP AT 40 SEC INTERVALS

DATA POINT 6							
STA	P0	T0	T0	T1	T1	OPAP	OP
1	2.0232E-03	1.0732E-02	1.0302E-02	3.0302E-02	2.0302E-01	0.7302E-01	2.3302E-02
2	2.0232E-03	1.0732E-02	1.0302E-02	3.0302E-02	2.0302E-01	0.7302E-01	2.3302E-02
STA	L/D	DELTA E	L.E.				
1	1.702E-01	3.232E-01	4.032E-01				
2	2.377E-01	3.232E-01	4.032E-01				

LOCAL TEST PARAMETERS

TEST 122A + MIN STATION POWER OP1 AT 102 SEC OTHER OP AT 40 SEC INTERVALS

DATA POINT 6							
STA	P0	T0	T0	T1	T1	OPAP	OP
1	2.0232E-03	1.0732E-02	1.0302E-02	3.0302E-02	2.0302E-01	0.7302E-01	2.3302E-02
2	2.0232E-03	1.0732E-02	1.0302E-02	3.0302E-02	2.0302E-01	0.7302E-01	2.3302E-02
STA	L/D	DELTA E	L.E.				
1	1.702E-01	3.232E-01	4.032E-01				
2	2.377E-01	3.232E-01	4.032E-01				

LOCAL TEST PARAMETERS

TEST 122A + MIN STATION POWER OP1 AT 102 SEC OTHER OP AT 40 SEC INTERVALS

DATA POINT 7							
STA	P0	T0	T0	T1	T1	OPAP	OP
1	2.0232E-03	1.0732E-02	1.0302E-02	3.0302E-02	2.0302E-01	0.7302E-01	2.3302E-02
2	2.0232E-03	1.0732E-02	1.0302E-02	3.0302E-02	2.0302E-01	0.7302E-01	2.3302E-02
STA	L/D	DELTA E	L.E.				
1	1.702E-01	3.232E-01	4.032E-01				
2	2.377E-01	3.232E-01	4.032E-01				

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LIGUID SODIUM HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 13200 & MIN STEADY POWER API AT 120 SEC OTHER DATA IN SEC INTERVALS

AP = 0.1302E-03 D = 0.1321E-01 L = 0.402E-01 DELTA T0 = 0.3002E-01

POINT	DATA POINTS		
	TP-OUT	T	TP-IN
1	3.763E-03	3.631E-03	3.631E-03
2	3.667E-03	3.637E-03	2.931E-03
3	3.671E-03	2.931E-03	3.646E-03
4	3.666E-03	2.935E-03	3.494E-03
5	3.614E-03	3.494E-03	3.506E-03
6	3.666E-03	3.506E-03	3.192E-03
7	3.393E-03	3.192E-03	3.163E-03
8	3.036E-03	3.049E-03	2.936E-03
9	2.998E-03	2.998E-03	2.998E-03

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 133B 6 MIN STEADY POWER DP1 AT 130 SEC OTHER DATA 20 SEC INTERVALS

DATA POINT 1

STA	PB	T _B	T _H	T _I	Q/A	Q/AP	H	DEL TP	V3
1	3.599E 03	1.119E 02	1.040E 03	3.856E 02	2.037E 01	2.864E 01	0.193E -02	2.443E 02	1.483E 02
2	3.561E 03	1.204E 02	1.050E 03	3.697E 02	2.037E 01	2.800E 01	0.037E -02	2.432E 02	1.463E 02
STA	L/D	DELTA E	LE						
1	1.748E 01	3.304E 01	4.030E 00						
2	2.377E 01	3.304E 01	4.030E 00						

LOCAL TEST PARAMETERS

TEST 133B 6 MIN STEADY POWER DP1 AT 130 SEC OTHER DATA 20 SEC INTERVALS

DATA POINT 2

STA	PB	T _B	T _H	T _I	Q/A	Q/AP	H	DEL TP	V3
1	3.564E 03	1.111E 02	1.044E 03	3.632E 02	2.032E 01	2.863E 01	0.044E -02	2.521E 02	1.491E 02
2	3.546E 03	1.205E 02	1.070E 03	3.998E 02	2.032E 01	2.863E 01	0.178E -02	2.798E 02	1.467E 02
STA	L/D	DELTA E	LE						
1	1.748E 01	3.306E 01	4.030E 00						
2	2.377E 01	3.306E 01	4.030E 00						

LOCAL TEST PARAMETERS

TEST 133B 6 MIN STEADY POWER DP1 AT 130 SEC OTHER DATA 20 SEC INTERVALS

DATA POINT 3

STA	PB	T _B	T _H	T _I	Q/A	Q/AP	H	DEL TP	V3
1	3.568E 03	1.111E 02	1.050E 03	3.702E 02	2.035E 01	2.893E 01	7.746E -02	2.590E 02	1.481E 02
2	3.530E 03	1.205E 02	1.095E 03	4.323E 02	2.034E 01	2.893E 01	6.425E -02	3.128E 02	1.463E 02
STA	L/D	DELTA E	LE						
1	1.748E 01	3.303E 01	4.030E 00						
2	2.377E 01	3.303E 01	4.030E 00						

LOCAL TEST PARAMETERS

TEST 133B 6 MIN STEADY POWER DP1 AT 130 SEC OTHER DATA 20 SEC INTERVALS

DATA POINT 4

STA	PB	T _B	T _H	T _I	Q/A	Q/AP	H	DEL TP	V3
1	3.505E 03	1.108E 02	1.052E 03	3.725E 02	2.036E 01	2.004E 01	7.657E -02	2.617E 02	1.481E 02
2	3.547E 03	1.202E 02	1.105E 03	4.458E 02	2.035E 01	2.004E 01	6.158E -02	3.258E 02	1.467E 02
STA	L/D	DELTA E	LE						
1	1.748E 01	3.304E 01	4.030E 00						
2	2.377E 01	3.304E 01	4.030E 00						

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LOCAL TEST PARAMETERS

TEST 1330 6 MIN STEADY POWER OPI AT 130 SEC OTHER DATA 20 SEC INTERVALS

STA	PG	T ₀	T ₁	T ₂	DATA POINT 5			H	DEL	TF	VS
					Q/A	Q/AP	H				
1	3.511E 03	1.108E 02	1.053E 03	3.792E 02	2.023E 01	1.988E 01	7.411E-02	2.684E 02	6.041E-02	3.293E 02	1.464E 02
2	3.473E 03	1.202E 02	1.104E 03	4.493E 02	2.021E 01	1.988E 01	6.041E-02	2.684E 02	6.041E-02	3.293E 02	1.470E 02

LOCAL TEST PARAMETERS

TEST 1330 6 MIN STEADY POWER OPI AT 130 SEC OTHER DATA 20 SEC INTERVALS

STA	PG	T ₀	T ₁	T ₂	DATA POINT 6			H	DEL	TF	VS
					Q/A	Q/AP	H				
1	3.337E 03	1.047E 02	1.044E 03	3.788E 02	2.008E 01	1.977E 01	7.425E-02	2.664E 02	5.355E-02	3.353E 02	1.483E 02
2	3.309E 03	1.198E 02	1.118E 03	4.749E 02	2.002E 01	1.977E 01	5.355E-02	2.664E 02	5.355E-02	3.353E 02	1.489E 02

LOCAL TEST PARAMETERS

TEST 1330 6 MIN STEADY POWER OPI AT 130 SEC OTHER DATA 20 SEC INTERVALS

STA	PG	T ₀	T ₁	T ₂	DATA POINT 7			H	DEL	TF	VS
					Q/A	Q/AP	H				
1	3.200E 03	1.097E 02	1.077E 03	4.238E 02	1.998E 01	1.968E 01	6.386E-02	2.122E 02	5.943E-02	3.363E 02	1.473E 02
2	3.162E 03	1.166E 02	1.097E 03	4.463E 02	1.998E 01	1.968E 01	5.943E-02	2.122E 02	5.943E-02	3.363E 02	1.481E 02

LOCAL TEST PARAMETERS

TEST 1330 6 MIN STEADY POWER OPI AT 130 SEC OTHER DATA 20 SEC INTERVALS

STA	PG	T ₀	T ₁	T ₂	DATA POINT 8			H	DEL	TF	VS
					Q/A	Q/AP	H				
1	3.066E 03	1.093E 02	1.073E 03	4.185E 02	1.998E 01	1.968E 01	6.406E-02	2.094E 02	5.941E-02	3.351E 02	1.477E 02
2	3.022E 03	1.167E 02	1.113E 03	4.656E 02	1.998E 01	1.968E 01	5.941E-02	2.094E 02	5.941E-02	3.351E 02	1.483E 02

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TEST 1330 6 MIN STEADY POWER OP1 AT 130 SEC OTHER DATA 20 SEC INTERVALS

LOCAL TEST PARAMETERS

STA	P/P	T0	T1	G/A	DATA POINT 9	
					T0	T1
1	2.933E-03	1.093E-02	1.093E-02	1.093E-02	1.093E-02	1.093E-02
2	2.093E-03	1.019E-02	1.019E-02	1.019E-02	1.019E-02	1.019E-02
STA	L/D	DELTA E	LE			
1	1.746E-01	3.274E-01	4.634E-01			
2	2.377E-01	3.274E-01	4.634E-01			

LOCAL TEST PARAMETERS

TEST 1330 6 MIN STEADY POWER OP1 AT 130 SEC OTHER DATA 20 SEC INTERVALS

DATA POINT 10

STA	P/P	T0	T1	G/A	DATA POINT 10	
					T0	T1
1	2.093E-03	1.093E-02	1.093E-02	1.093E-02	1.093E-02	1.093E-02
2	2.014E-03	1.182E-02	1.182E-02	1.182E-02	1.182E-02	1.182E-02
STA	L/D	DELTA E	LE			
1	1.746E-01	3.274E-01	4.634E-01			
2	2.377E-01	3.274E-01	4.634E-01			

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

X TEST 134 BURNOUT AFTER DATA POINT 6

AF = 0.132E-03 D = 0.132E-01 L = 0.490E-01 DELTA T = 0.150E-01

DATA POINTS

POINT	FB-IN	FB-OUT	TB-IN	TB-OUT	U	E2	12	DP	WT 600	5.621E-03
1	0.150E-02	0.550E-02	0.490E-01	1.024E-02	1.160E-00	1.140E-01	4.110E-02	4.477E-00	5.621E-03	5.621E-03
2	0.150E-02	0.550E-02	0.490E-01	1.024E-02	1.170E-00	1.310E-01	5.350E-02	7.663E-00	1.150E-01	8.290E-03
3	0.100E-02	0.500E-02	0.420E-01	1.024E-02	1.177E-00	2.493E-01	6.670E-02	2.644E-01	-2.440E-01	0.391E-03
4	0.950E-02	0.450E-02	0.380E-01	1.397E-02	1.177E-00	3.197E-01	1.990E-02	3.310E-01	1.990E-01	0.391E-03
5	0.800E-02	0.400E-02	0.350E-01	1.474E-02	1.174E-00	3.478E-01	1.163E-02	3.553E-01	-0.663E-01	0.320E-03
6	0.600E-02	0.400E-02	0.300E-01	1.548E-02	1.164E-00	3.667E-01	1.200E-02	4.330E-01	-2.413E-01	0.340E-03

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 134 BURNOUT AFTER DATA POINT 6

STA	PB	T _B	T _I	DATA POINT 1			H	DEL. TP	V _S
				T _B	T _I	O/A			
1	6.650E 02	9.645E 01	2.260E 02	1.363E 02	2.037E 00	1.091E 00	5.438E 02	3.464E 01	9.679E 01
2	6.717E 02	1.003E 02	2.250E 02	1.343E 02	2.037E 00	1.091E 00	5.667E 02	3.293E 01	9.668E 01
3	6.593E 02	1.020E 02	2.320E 02	1.416E 02	2.036E 00	1.091E 00	5.663E 02	3.293E 01	9.663E 01

LOCAL TEST PARAMETERS

TEST 134 BURNOUT AFTER DATA POINT 6

STA	PB	T _B	T _I	DATA POINT 2			H	DEL. TP	V _S
				T _B	T _I	O/A			
1	6.625E 02	1.000E 02	3.180E 02	1.668E 02	3.507E 00	3.417E 00	5.623E 02	6.800E 01	9.671E 01
2	6.681E 02	1.031E 02	3.190E 02	1.700E 02	3.507E 00	3.417E 00	5.139E 02	6.648E 01	9.668E 01
3	6.533E 02	1.061E 02	3.370E 02	1.623E 02	3.508E 00	3.417E 00	4.497E 02	7.616E 01	9.693E 01

LOCAL TEST PARAMETERS

TEST 134 BURNOUT AFTER DATA POINT 6

STA	PB	T _B	T _I	DATA POINT 3			H	DEL. TP	V _S
				T _B	T _I	O/A			
1	6.600E 02	1.000E 02	6.180E 02	2.678E 02	3.304E 00	0.114E 00	5.732E 02	1.964E 02	9.699E 01
2	6.667E 02	1.153E 02	6.100E 02	2.578E 02	3.303E 00	0.114E 00	6.398E 02	1.425E 02	9.723E 01
3	6.533E 02	1.218E 02	6.300E 02	2.903E 02	3.304E 00	0.114E 00	5.416E 02	1.669E 02	9.749E 01

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LOCAL TEST PARAMETERS

TEST 134 BURNOUT AFTER DATA POINT 6

STA	PB	DATA POINT 4			
		TB	T ₀	T ₁	T ₂
1	0.735E 02	1.167E 02	0.530E 02	3.261E 02	1.510E 01
2	0.611E 02	1.260E 02	0.400E 02	3.087E 02	1.510E 01
3	0.493E 02	1.371E 02	0.730E 02	3.527E 02	1.510E 01

STA	L/D	DATA POINT 5			
		DELTA E	LE	T ₀	T ₁
1	1.495E 01	3.197E 01	4.500E 00	3.030E 02	1.703E 01
2	2.044E 01	3.197E 01	4.500E 00	3.148E 02	1.734E 01
3	2.673E 01	3.197E 01	4.500E 00	3.711E 02	1.781E 01

LOCAL TEST PARAMETERS

TEST 134 BURNOUT AFTER DATA POINT 6

STA	PB	DATA POINT 5			
		TB	T ₀	T ₁	T ₂
1	0.735E 02	1.260E 02	0.430E 02	3.393E 02	1.703E 01
2	0.605E 02	1.324E 02	0.260E 02	3.148E 02	1.734E 01
3	0.485E 02	1.449E 02	0.670E 02	3.711E 02	1.781E 01

STA	L/D	DATA POINT 6			
		DELTA E	LE	T ₀	T ₁
1	1.495E 01	3.474E 01	4.500E 00	3.047E 02	1.930E 01
2	2.044E 01	3.474E 01	4.500E 00	3.474E 02	1.944E 01
3	2.673E 01	3.474E 01	4.500E 00	3.920E 02	1.973E 01

LOCAL TEST PARAMETERS

TEST 134 BURNOUT AFTER DATA POINT 6

STA	PB	DATA POINT 6			
		TB	T ₀	T ₁	T ₂
1	0.735E 02	1.241E 02	1.610E 02	3.559E 02	1.930E 01
2	0.611E 02	1.378E 02	0.350E 02	3.292E 02	1.901E 01
3	0.485E 02	1.514E 02	1.840E 02	3.920E 02	1.973E 01

STA	L/D	DATA POINT 6			
		DELTA E	LE	T ₀	T ₁
1	1.495E 01	3.667E 01	4.500E 00	3.050E 02	1.950E 01
2	2.044E 01	3.667E 01	4.500E 00	3.667E 02	1.991E 01
3	2.673E 01	3.667E 01	4.500E 00	3.991E 02	2.030E 01

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DIMENSIONLESS PARAMETERS

TEST 130: EJECTOR A vs 3 DATA POINT 6

DATA PCINT	STA	MU	PR	RE	TE/TB	MU/PR(=1)
1	1	1.6614E 93	4.1748E 00	1.7749E 00	1.6667E 00	1.6667E 00
2	1	1.1632E 63	4.1137E 00	1.7939E 00	1.6503E 00	1.6503E 00
3	2	9.7339E 02	4.2663E 00	1.8266E 00	1.6748E 00	1.6667E 00
4	1	6.7229E 02	4.0934E 00	1.8922E 00	1.6213E 00	1.6667E 00
5	2	6.9179E 02	4.8642E 00	1.8379E 00	1.1180E 00	1.1177E 00
6	2	6.6744E 02	5.9163E 00	1.8716E 00	1.1208E 00	1.1208E 00
7	1	1.1026E 93	3.6318E 00	1.9937E 00	1.2797E 00	1.2797E 00
8	1	1.2115E 03	3.6343E 00	1.9910E 00	1.2677E 00	1.2797E 00
9	2	1.9214E 03	3.6433E 00	2.0037E 00	1.2994E 00	1.2994E 00
10	2	1.3941E 03	3.6604E 00	2.0111E 00	1.3030E 00	1.3030E 00
11	2	1.3210E 03	3.7013E 00	2.1573E 00	1.3036E 00	1.3036E 00
12	3	1.2643E 03	3.6843E 00	2.2948E 00	1.3804E 00	1.3797E 00
13	1	1.6530E 03	3.4914E 00	2.0598E 00	1.3713E 00	1.3713E 00
14	1	1.7685E 03	3.1794E 00	2.2246E 00	1.3078E 00	1.1113E 00
15	2	1.3954E 03	2.9181E 00	2.3630E 00	1.3779E 00	1.4493E 00
16	3	1.5623E 03	3.2776E 00	2.8944E 00	1.3926E 00	1.3926E 00
17	4	1.6541E 03	3.6826E 00	2.2775E 00	1.3203E 00	1.1666E 00
18	2	1.6617E 03	2.7371E 00	2.6533E 00	1.3036E 00	1.3036E 00

DATA PCINT	STA	MU RATIO	R RATIO	MU RATIO	CP RATIO
1	1	1.0165E 00	9.4644E -01	1.2613E 00	1.6634E 00
2	2	1.0165E 00	9.5634E -01	1.2574E 00	1.6621E 00
3	3	1.0170E 00	9.4224E -01	1.2964E 00	1.3892E 00
4	1	1.0226E 00	9.0793E -01	1.5260E 00	1.0032E 00
5	2	1.0227E 00	9.1034E -01	1.5904E 00	1.0023E 00
6	3	1.0333E 00	9.6137E -01	1.5784E 00	1.0020E 00
7	2	1.0723E 00	8.5551E -01	2.2515E 00	1.0000E 00
8	2	1.0645E 00	8.6732E -01	2.0727E 00	9.9471E -01
9	3	1.0776E 00	8.6634E -01	2.2422E 00	9.9031E -01
10	3	1.0981E 00	8.5366E -01	2.6738E 00	1.0018E 00
11	2	1.0846E 00	8.6913E -01	2.3308E 00	9.9075E -01
12	2	1.1022E 00	8.7841E -01	2.5823E 00	9.9985E -01
13	2	1.1025E 00	8.5745E -01	2.7255E 00	1.0016E 00
14	2	1.0651E 00	8.7516E -01	2.3071E 00	9.9015E -01
15	3	1.1085E 00	8.6863E -01	2.6455E 00	1.0009E 00
16	1	1.1100E 00	8.6165E -01	2.8304E 00	1.0024E 00
17	1	1.0849E 00	8.8022E -01	2.3627E 00	9.9002E -01
18	3	1.1117E 00	8.9265E -01	2.7390E 00	1.0039E 00

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DIMENSIONLESS PARAMETERS

TEST 134 BURNOUT AFTER DATA POINT 6

DATA POINT	STA	NC(F)	PR(F)	RE(F)	T1/TP	HAL/PAL(,A)
1	1	1.0323E 03	3.5837E 00	2.0041E 05	1.0318E 00	6.1963E 02
1	2	1.1152E 03	3.5750E 00	2.0094E 05	1.0294E 00	6.6993E 02
1	3	9.4935E 02	3.4399E 00	2.0731E 05	1.0302E 00	5.7612E 02
1	4	9.3021E 02	3.1159E 00	2.2337E 05	1.0572E 00	5.9941E 02
2	1	9.4920E 02	3.0746E 00	2.2598E 05	1.0557E 00	6.0563E 02
2	2	9.2000E 02	2.9219E 00	2.3504E 05	1.0633E 00	5.3403E 02
2	3	9.9259E 02	2.1851E 00	2.9473E 05	1.1226E 05	7.2667E 02
2	4	1.1057E 03	2.2099E 00	2.9306E 05	1.1192E 00	8.0913E 02
2	5	9.2169E 02	1.9781E 00	3.2064E 05	1.1266E 00	7.0162E 02
2	6	1.1983E 03	1.6397E 00	3.4034E 05	1.1534E 00	9.3333E 02
2	7	1.3723E 03	1.6632E 00	3.3764E 05	1.1341E 00	1.6679E 02
2	8	1.1359E 03	1.6451E 00	3.7428E 05	1.1529E 00	9.3333E 02
2	9	1.3333E 03	1.7632E 00	3.5041E 05	1.1566E 00	1.6624E 02
2	10	1.6557E 03	1.8116E 00	3.4461E 05	1.1334E 00	1.2559E 02
2	11	1.2632E 03	1.5591E 00	3.9143E 05	1.1579E 00	1.6576E 02
2	12	1.3846E 03	1.6693E 00	3.6181E 05	1.1656E 00	1.1256E 02
2	13	1.6628E 03	1.7391E 00	3.9539E 05	1.1386E 00	1.3589E 02
2	14	1.3161E 03	1.4741E 00	4.0797E 05	1.1644E 00	1.1266E 02

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Liquid Side Heat Transfer Test Data

Overall Test Parameters

TEST 135.00 AT OF6,DP1-100 SEC.DP6-146 SEC.OTHER DATA AT 10 SEC INTERVAL.

AF = 0.132E-03 C = 0.132E-01 L = 0.000E 01 DELTA TD = 0.160E 01

DATA POINTS

PC1#1	PB-1A	PB-CL1	TB-1A	TB-OUT	%	62	12	DP.	WT. BUL.	C
1	3.337E C5	3.210E 03	7.970E 01	1.293E 02	1.849E 00	3.055E 01	1.513E 03	5.553E 01	-2.136E 00	1.343E 00
2	3.336E 03	2.269E 03	7.970E 01	1.305E 02	1.852E 00	3.059E 01	1.533E 03	5.663E 01	-2.574E 00	1.344E 00
3	3.330E 03	2.203E 03	7.975E 01	1.307E 02	1.849E 00	3.059E 01	1.534E 03	5.669E 01	-2.998E 00	1.343E 00
4	3.327E 03	2.202E 03	7.970E 01	1.311E 02	1.859E 00	3.011E 01	1.536E 03	5.663E 01	-3.831E 00	1.343E 00
5	3.325E 03	3.200E 03	7.969E 01	1.314E 02	1.851E 00	3.014E 01	1.532E 03	5.656E 01	-4.644E 00	1.343E 00
6	3.321E 03	3.197E 03	7.945E 01	1.314E 02	1.840E 00	3.016E 01	1.534E 03	5.659E 01	-3.962E 00	1.337E 00

TEST SECTION

Local Test Parameters

TEST 135.00 AT OF6,DP1-100 SEC.DP6-146 SEC.OTHER DATA AT 10 SEC INTERVAL.

DATA POINT 1

STA	PB	TB	T _B	T _I	Q/A	Q/AP	H	DEL TF	V _S
1	3.210E 03	1.262E 02	1.221E 03	3.071E 02	2.790E 01	2.777E 01	1.536E-01	1.609E 02	1.534E 02
STA	L/D	DELTA E	LE						
1	2.356E 01	3.056E 01	4.000E 00						

LOCAL TEST PARAMETERS

TEST 135.80 AT DP6.DP1-100 SEC.DP6-146 SEC.OTHER DATA AT 10 SEC INTERVAL

DATA POINT 2							
STA	PB	T _B	T _A	T _I	G/A	Q/AP	V _S
1	3.217E 03	1.221E 02	1.245E 03	3.191E 02	2.848E 01	2.035E 01	1.477E-01
STA	L/D	DELTA E	LE				1.919E 02
1	2.358E 01	3.658E 01	4.002E 00				1.538E 02

LOCAL TEST PARAMETERS

TEST 135.80 AT DP6.DP1-100 SEC.DP6-146 SEC.OTHER DATA AT 10 SEC INTERVAL

DATA POINT 3							
STA	PB	T _B	T _A	T _I	G/A	Q/AP	V _S
1	3.211E 03	1.275E 02	1.251E 03	3.218E 02	2.869E 01	2.044E 01	1.464E-01
STA	L/D	DELTA E	LE				1.943E 02
1	2.358E 01	3.9C9E 01	4.002E 00				1.535E 02

LOCAL TEST PARAMETERS

TEST 135.80 AT DP6.DP1-100 SEC.DP6-146 SEC.OTHER DATA AT 10 SEC INTERVAL

DATA POINT 4							
STA	PB	T _B	T _A	T _I	G/A	Q/AP	V _S
1	3.210E 03	1.279E 02	1.254E 03	3.253E 02	2.867E 01	2.055E 01	1.446E-01
STA	L/D	DELTA E	LE				1.974E 02
1	2.358E 01	3.911E 01	4.002E 00				1.543E 02

LOCAL TEST PARAMETERS

TEST 135.80 AT DP6.DP1-100 SEC.DP6-146 SEC.OTHER DATA AT 10 SEC INTERVAL

DATA POINT 5							
STA	PB	T _B	T _A	T _I	G/A	Q/AP	V _S
1	3.208E 03	1.282E 02	1.255E 03	3.297E 02	2.871E 01	2.064E 01	1.411E-01
STA	L/D	DELTA E	LE				2.014E 02
1	2.358E 01	3.914E 01	4.002E 00				1.537E 02

LOCAL TEST PARAMETERS

TEST 135.80 AT DP6.DP1-100 SEC.DP6-146 SEC.OTHER DATA AT 10 SEC INTERVAL

DATA POINT 6							
STA	PB	T _B	T _A	T _I	G/A	Q/AP	V _S
1	3.202E 03	1.287E 02	1.254E 03	3.061E 02	2.874E 01	2.065E 01	1.611E-01
STA	L/D	DELTA E	LE				1.767E 02
1	2.358E 01	3.916E 01	4.002E 00				1.522E 02

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Liquid Side Heat Transfer Test Data

CIVIC ALL TEST PAPERS

TEST 1340 MIN STABILITY 1001-4C SEC. 01 TEST DATA AT 20 SEC INTERVALS

AF = $\frac{2 \cdot 1.5 \cdot 1 - 2}{2 \cdot 1} = 0.5$

PLINN	P&J-405			P&J-414			P&J-415			P&J-416			P&J-417			P&J-418		
	P&J	W	G	P&J	W	G	P&J	W	G	P&J	W	G	P&J	W	G	P&J	W	G
1	2.073C	C3	2.712E	G3	7.024E	01	1.162E	02	1.080E	00	3.052E	01	1.372E	03	4.540E	01	1.364E	04
2	2.052C	C3	2.652E	G3	7.024E	01	1.167L	02	1.087L	00	3.052E	01	1.373E	03	4.554E	01	1.365E	04
3	2.041C	C3	2.672E	G3	7.054L	31	1.162L	02	1.087L	00	3.052E	01	1.372E	03	4.576E	01	1.364E	04
4	2.030C	C3	2.663E	G3	7.053E	01	1.165L	02	1.087L	00	3.052E	01	1.371L	03	4.581E	01	1.365E	04
5	2.030C	C3	2.673E	G3	7.050L	31	1.159L	02	1.084E	00	3.052E	01	1.367E	03	4.562E	01	1.374E	04
6	2.042C	C3	2.704L	G3	7.329E	31	1.139E	02	1.051E	00	3.050E	01	1.362E	03	4.511E	01	1.373E	04
7	2.029C	C3	2.705E	G3	7.553E	01	1.150L	02	1.090E	00	3.051E	01	1.362E	03	4.535E	01	1.372E	04
8	2.018C	C3	2.710E	G3	7.649L	31	1.153L	02	1.094E	00	3.050E	01	1.360L	03	4.501E	01	1.374E	04
9	2.043C	C3	2.670C	G3	7.007E	01	1.152L	02	1.084E	00	3.050E	01	1.352L	03	4.527E	01	1.371L	04
10	2.018C	C3	2.717E	G3	7.047E	01	1.152L	02	1.080E	00	3.050E	01	1.362E	03	4.524E	01	1.371E	04
11	2.041C	C3	2.677L	G3	7.045L	01	1.132L	02	1.088E	00	3.050E	01	1.353E	03	4.514E	01	1.363E	04
12	2.010L	C3	2.717E	G3	7.046E	01	1.152E	02	1.084E	00	3.051E	01	1.363E	03	4.537E	01	1.373E	04
13	2.010C	C3	2.727L	G3	7.020L	01	1.153L	02	1.084E	00	3.050E	01	1.356E	03	4.513E	01	1.374E	04
14	2.019C	C3	2.727E	G3	7.009E	01	1.152L	02	1.084E	00	3.050E	01	1.361E	03	4.534E	01	1.374E	04
15	2.039C	C3	2.671L	G3	7.044L	01	1.153L	02	1.087L	00	3.051L	01	1.367L	03	4.523E	01	1.365E	04
16	2.043C	C3	2.672L	G3	7.044E	01	1.153L	02	1.087L	00	3.051L	01	1.367L	03	4.531E	01	1.362E	04

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TEST SECTION - LOCAL TEST PARAMETERS
TEST 1364.5 HIA STEADY PUMPS, 001-70 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 1									
STA	PB	T ₀	T ₁	T ₂	W/A	W/AP	"	DEL TF	V/S
1	2.772E 03	1.042E 02	1.144E 03	3.057E 02	2.333E 01	2.242E 01	0.050E-02	2.031E 02	1.540E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.521E C1	4.000E 00						
DATA POINT 2									
STA	PB	T ₀	T ₁	T ₂	W/A	W/AP	"	DEL TF	V/S
1	2.754E 03	1.040E 02	1.137E 03	3.055E 02	2.335E 01	2.249E 01	0.0517L-02	2.033E 02	1.535E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.522E C1	4.000E 00						
DATA POINT 3									
STA	PB	T ₀	T ₁	T ₂	W/A	W/AP	"	DEL TF	V/S
1	2.610E 03	1.038E 02	1.142E 03	3.079E 02	2.334E 01	2.251E 01	0.055E-02	2.041E 02	1.528E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.520E 01	4.000E 00						
DATA POINT 4									
STA	PB	T ₀	T ₁	T ₂	W/A	W/AP	"	DEL TF	V/S
1	2.609E 03	1.033E 02	1.143E 03	3.074E 02	2.342E 01	2.252E 01	0.0513E-02	2.039E 02	1.526E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.525E 01	4.000E 00						
DATA POINT 5									
STA	PB	T ₀	T ₁	T ₂	W/A	W/AP	"	DEL TF	V/S
1	2.634E 03	1.032E 02	1.145E 03	3.0517E 02	2.337E 01	2.253E 01	0.194E-02	2.036E 02	1.537E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.523E C1	4.000E 00						
DATA POINT 6									
STA	PB	T ₀	T ₁	T ₂	W/A	W/AP	"	DEL TF	V/S
1	2.625E 03	1.025E 02	1.132E 03	3.0452E 02	2.322E 01	2.267E 01	0.513E-02	2.040E 02	1.531E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.565E C1	4.000E 00						

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TEST 136A.5 MIN STEADY PUFF, L/D=1-90 SEC. WTHIN DATA AT 20 SEC INTERVALS

DATA POINT 7									
STA	PB	T _B	T _I	T _H	Q/A	Q/AP	H	DEL TF	VS
1	2.824E 0.5	1.020E 0.2	1.131E 0.5	3.662E 0.2	2.326E 0.1	2.269E 0.1	3.614E-02	2.634E 0.2	1.553E 0.2
STA	L/D	DELTA L	LE						
1	1.730E 0.1	3.512E 0.1	4.000E 0.0						
DATA POINT 6									
STA	PB	T _B	T _I	T _H	Q/A	Q/AP	H	DEL TF	VS
1	2.815E 0.3	1.027E 0.2	1.142E 0.3	3.657E 0.2	2.317E 0.1	2.261E 0.1	3.989E-02	2.635E 0.2	1.556E 0.2
STA	L/D	DELTA L	LE						
1	1.730E 0.1	3.505E 0.1	4.000E 0.0						
DATA POINT 9									
STA	PB	T _B	T _I	T _H	Q/A	Q/AP	H	DEL TF	VS
1	2.824E 0.3	1.024E 0.2	1.137E 0.3	3.704E 0.2	2.322E 0.1	2.265E 0.1	3.274E-02	2.738E 0.2	1.552E 0.2
STA	L/D	DELTA L	LE						
1	1.730E 0.1	3.505E 0.1	4.000E 0.0						
DATA POINT 10									
STA	PB	T _B	T _I	T _H	Q/A	Q/AP	H	DEL TF	VS
1	2.819E 0.3	1.025E 0.2	1.149E 0.3	3.647E 0.2	2.321E 0.1	2.266E 0.1	3.753E-02	2.922E 0.2	1.552E 0.2
STA	L/D	DELTA L	LE						
1	1.730E 0.1	3.507E 0.1	4.000E 0.0						
DATA POINT 11									
STA	PB	T _B	T _I	T _H	Q/A	Q/AP	H	DEL TF	VS
1	2.814E 0.3	1.025E 0.2	1.144E 0.3	3.681E 0.2	2.319E 0.1	2.259E 0.1	3.909E-02	2.855E 0.2	1.550E 0.2
STA	L/D	DELTA L	LE						
1	1.730E 0.1	3.506E 0.1	4.000E 0.0						
DATA POINT 12									
STA	PB	T _B	T _I	T _H	Q/A	Q/AP	H	DEL TF	VS
1	2.810E 0.3	1.025E 0.2	1.144E 0.3	3.655E 0.2	2.325E 0.1	2.270E 0.1	3.024E-02	2.629E 0.2	1.550E 0.2
STA	L/D	DELTA L	LE						
1	1.730E 0.1	3.511E 0.1	4.000E 0.0						

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TEST SECTION - LOCAL TEST PARAMETERS
TEST 136A.5 MIN STEADY POWER, OPI-90 SEC, OTHER DATA AT 20 SEC INTERVALS

DATA POINT 13									
STA	PB	T _B	T _A	T _E	Q/A	Q/AP	H	DEL TF	VS
1	2.610E 03	1.028E 02	1.154E 03	4.000E 02	2.324E 01	2.257E 01	7.573E-02	2.981E 02	1.556E 02
STA	L/D	DELTA E	LE						
1	1.730E C1	3.504E 01	4.000E 03						
DATA POINT 14									
STA	PB	T _B	T _A	T _E	Q/A	Q/AP	H	DEL TF	VS
1	2.610E 03	1.026E 02	1.154E 03	3.972E 02	2.333E 01	2.270E 01	7.706E-02	2.946E 02	1.552E 02
STA	L/D	DELTA E	LE						
1	1.730E C1	3.516E 01	4.000E 00						
DATA POINT 15									
STA	PB	T _B	T _A	T _E	Q/A	Q/AP	H	DEL TF	VS
1	2.605E 03	1.025E 02	1.160E 03	4.073E 02	2.329E 01	2.263E 01	7.425E-02	3.048E 02	1.550E 02
STA	L/D	DELTA E	LE						
1	1.730E C1	3.513E 01	4.000E 00						
DATA POINT 16									
STA	PB	T _B	T _A	T _E	Q/A	Q/AP	H	DEL TF	VS
1	2.600E C3	1.025E 02	1.160E 03	4.054E 02	2.334E 01	2.267E 01	7.449E-02	3.027E 02	1.542E 02
STA	L/D	DELTA E	LE						
1	1.730E C1	3.517E 01	4.000E 00						

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DIMENSIONLESS PARAMETERS

TEST 130A.5 MIN STEADY PCHLW.DPL-90 SEC. GITHEN DATA AT 20 SEC INTERVALS

DATA POINT	STA	MU	PR	RE	T/TB	MU/PRI(1.0)
1	1	1.5000E 03	3.9000E 00	2.4465E 05	1.5021E 00	5.3266E 02
2	1	1.6719E 03	3.6475E 00	2.4533E 05	1.4713E 03	9.6117E 02
3	1	1.6210E 03	3.9931E 00	2.9496E 05	1.4801E 00	9.3202E 02
4	1	1.6127E 03	3.5937E 00	2.9495E 05	1.4892E 00	9.2646E 02
5	1	1.5620E 03	4.0146E 00	2.9475E 05	1.4945E 00	9.1302E 02
6	1	1.6530E 03	4.0237E 00	2.9511E 05	1.4731E 03	9.4761E 02
7	1	1.6738E 03	4.0277E 00	2.9522E 05	1.4669E 03	9.5409E 02
8	1	1.3522E 03	4.0311E 00	2.9573E 05	1.4030E 00	6.8895E 02
9	1	1.6001E 03	4.0326E 00	2.9269E 05	1.4460E 00	9.2066E 02
10	1	1.5074E 03	4.0361E 00	2.9265E 05	1.4194E 00	6.6267E 02
11	1	1.5375E 03	4.0360E 00	2.9215E 05	1.5076E 00	6.7943E 02
12	1	1.5597E 03	4.0346E 00	2.9350E 05	1.5023E 00	6.9272E 02
13	1	1.6715E 03	4.0304E 00	2.9390E 05	1.5239E 03	6.4275E 02
14	1	1.6557E 03	4.0324E 00	2.9367E 05	1.5443E 03	6.5744E 02
15	1	1.6943E 03	4.0350E 00	2.9235E 05	1.5411E 00	6.2601E 02
16	1	1.6555E 03	4.0364E 00	2.9077E 05	1.5349E 00	6.1331E 02

DIMENSIONLESS PARAMETERS

DATA POINT	STA	MU(t)	P(M/F)	ME(F)	T/TF	MU/PRI(1.0)
1	1	1.3443E 03	1.6426E 00	5.9003E 05	1.2037E 00	1.1027E 03
2	1	1.4379E 03	1.7339E 00	5.7304E 05	1.1903E 00	1.1612E 03
3	1	1.3929E 03	1.6793E 00	5.8149E 05	1.1953E 00	1.1321E 03
4	1	1.6447E 03	1.6731E 00	5.8325E 05	1.1903E 00	1.1270E 03
5	1	1.3550E 03	1.7139E 00	5.8679E 05	1.1935E 00	1.1124E 03
6	1	1.4222E 03	1.7139E 00	5.7507E 05	1.1913E 00	1.1559E 03
7	1	1.4494E 03	1.7261E 00	5.6872E 05	1.1896E 00	1.1573E 03
8	1	1.3291E 03	1.6547E 00	5.9044E 05	1.2013E 00	1.0566E 03
9	1	1.3759E 03	1.6692E 00	5.7902E 05	1.1957E 00	1.1150E 03
10	1	1.2674E 03	1.6234E 00	5.9618E 05	1.2062E 00	1.3606E 03
11	1	1.3151E 03	1.6469E 00	5.9022E 05	1.2024E 00	1.0772E 03
12	1	1.3351E 03	1.6500E 00	5.9005E 05	1.2039E 00	1.0912E 03
13	1	1.2554E 03	1.6015E 00	5.0660E 05	1.2094E 00	1.0398E 03
14	1	1.2786E 03	1.6143E 00	5.0100E 05	1.2073E 00	1.0557E 03
15	1	1.2937E 03	1.5804E 00	5.1100E 05	1.2131E 00	1.0230E 03
16	1	1.2464E 03	1.5072E 00	6.0500E 05	1.2120E 00	1.0311E 03

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 1362.00 AT CR 7.0PI1-125 SEC. UP7-167SEC. OTHER DATA AT 10 SEC INTERVAL

AF = 0.13E-01 D = 0.132E-01 L = 0.000E 01 DELTA T_C = 0.260E 01

DATA POINTS

POINT	PB-IN	PB-OUT	TG-IN	TG-OUT	C2	I2	QP	HT BA1	C
1	2.095E 03	2.7E 5E 03	2.4C0E 01	1.266E 02	1.0350E 00	3.053E 01	1.414E 03	4.097E 01	1.343E 00
2	2.095E 03	2.7E 5E 03	2.4CCE 01	1.289E 02	1.057E 00	3.059E 01	1.414E 03	4.095E 01	1.342E 00
3	2.095E 03	2.7E 0E 03	2.400E 01	1.289E 02	1.061E 00	3.053E 01	1.415E 03	4.093E 01	1.342E 00
4	2.095E 03	2.7E 0E 03	2.400E 01	1.289E 02	1.061E 00	3.057E 01	1.415E 03	4.093E 01	1.351E 00
5	2.095E 03	2.7E 0E 03	2.400E 01	1.291E 02	1.057E 00	3.054E 01	1.414E 03	4.092E 01	1.351E 00
6	2.095E 03	2.7E 0E 03	2.400E 01	1.292E 02	1.063E 00	3.054E 01	1.414E 03	4.093E 01	1.349E 00
7	2.095E 03	2.7E 0E 03	2.400E 01	1.295F 02	1.061E 00	3.063E 01	1.414E 03	4.089E 01	1.353E 00
								-3.93E 01	1.351E 00

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TEST SECTION - LOCAL TEST PARAMETERS

TELE 1 2000-05 AI NO 7-0051-122 SEC. 1007-102 2000-05-16 DATA AS 10 2000 INSTITUTE

DATA PULLER

DATA POINT 2

STA	μ_{LC}	T_b	T_e	T_f	ΔT_f	W.L. FF	VS
1	2.026e-03	1.014e-02	1.022e-03	4.028e-02	2.052e-01	2.050e-01	0/AP
STA	L/S	MELTA E	L/E				

SIA	L/U	DELTA E	LE	T1	WAD	H	DEL TF	V5	V2
1	2.012E-03	1.042E-02	1.233E-03	4.0405E-02	2.051E-01	2.053E-01	7.395E-02	5.031E-02	1.0537E-02

DATA POINT		$\frac{dH}{dt}$	T_u	T_b	$\frac{dA}{dt}$	N	$D_{TL} \cdot T_F$	VS
1	$-2.031E-03$	$1.150E-02$	$1.227E-03$	$4.584E-02$	$2.512E-01$	$2.451E-01$	$7.138E-02$	$1.034E-02$

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TEST SECTION - LOCAL TEST PARAMETERS
TEST 13000.00 AT CP 7.0P1-125 SEC. UP7-187 SEC. OTHER DATA AT 10 SEC INTERVAL

		DATA POINT 7						
STA	PH	T _B	T _I	W/A	Q/AP	H	DCL/TF	V _S
1	2.0828E 03	1.153E 02	1.457E 03	4.079E 02	2.523E 01	2.457E 01	3.527E 02	1.537E 02
2	L/D	DELTA L	LE					
3	1.730E 01	3.6C3L 01	4.000E 00					

DIMENSIONLESS PARAMETERS

TEST 13000.00 AT CP 7.0P1-125 SEC. UP7-187 SEC. OTHER DATA AT 10 SEC INTERVAL

DATA POINT	STA	MU	P _R	RE	T _I /T _B	MU/P _R (1.4)
1	1	1.510E 03	3.0550E 00	3.1159E 05	1.3507E 00	9.0294E 02
2	1	1.751E 03	3.0551E 00	3.1263E 05	1.5004E 00	b=de37E 02
3	1	1.641E 03	3.0600E 00	3.1369E 05	1.3706E 00	d=el125E 02
4	1	1.4557E 03	3.0456E 00	3.1359E 05	1.5772E 00	0.4014E 02
5	1	1.3614E 03	3.0427E 00	3.1351E 05	1.5972E 00	6.1173E 02
6	1	1.3725E 03	3.0407E 00	3.1467E 05	1.5911E 00	0.1854E 02
7	1	1.3283E 03	3.0343E 00	3.1478E 05	1.6130E 00	7.9270E 02

DATA POINT	STA	MU(F)	P _R (F)	H _C (F)	T _I /TF	MU/P _R (1.4)
1	1	1.4951E 03	1.4922E 00	0.3175E 05	1.2110E 00	1.1140E 03
2	1	1.2600E 03	1.0764E 00	6.39085E 05	1.2140E 00	1.1004E 03
3	1	1.2130E 03	1.4233E 00	6.0159E 05	1.2238E 00	1.0534E 03
4	1	1.2115E 03	1.0224E 00	6.0194E 05	1.2240E 00	1.0526E 03
5	1	1.0600E 03	1.3894E 00	6.7396E 05	1.2294E 00	1.0246E 03
6	1	1.1789E 03	1.3980E 00	6.7223E 05	1.2201E 00	1.0300E 03
7	1	1.1391E 03	1.3021E 00	6.0716E 05	1.2394E 00	1.0067E 03

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Liquid Side Heat Transfer Test Data

Overall Test Parameters

TEST 137A.5 MIN STEADY POWER.DPL-140 SEC. OTHER DATA AT 20 SEC INTERVALS

AF = 0.273E-03 C = 0.212E-01 L = 0.500E 01 DELTA T₀ = 0.700E 00

POINT	PB-1A	PB-0LT	DATA POINTS			WT. OIL
			TB-1A	TB-0LT	B	
1	3.752E 03	3.750E 03	5.900E 01	1.377E 02	1.143E 00	2.650E 01
2	3.747E 03	3.745E 03	5.880E 01	1.380E 02	1.141E 00	2.652E 01
3	3.744E 03	3.742E 03	5.850E 01	1.379E 02	1.141E 00	2.651E 01
4	3.738E 03	3.736E 03	5.840E 01	1.380E 02	1.144E 00	2.652E 01
5	3.735E 03	3.733E 03	5.810E 01	1.377E 02	1.139E 00	2.653E 01
6	3.731E 03	3.729E 03	5.810E 01	1.379E 02	1.138E 00	2.651E 01
7	3.727E 03	3.725E 03	5.800E 01	1.379E 02	1.161E 00	2.610E 01
8	3.724E 03	3.722E 03	5.780E 01	1.376E 02	1.134E 00	2.610E 01
9	3.721E 03	3.719E 03	5.760E 01	1.377E 02	1.130E 00	2.610E 01
10	3.716E 03	3.714E 03	5.750E 01	1.375E 02	1.130E 00	2.611E 01
11	3.712E 03	3.710E 03	5.740E 01	1.375E 02	1.131E 00	2.614E 01
12	3.710E 03	3.708E 03	5.730E 01	1.376E 02	1.130E 00	2.609E 01
13	3.702E 03	3.700E 03	5.630E 01	1.355E 02	1.149E 00	2.604E 01
14	3.697E 03	3.695E 03	5.620E 01	1.357E 02	1.156E 00	2.607E 01
15	3.692E 03	3.690E 03	5.600E 01	1.354E 02	1.149E 00	2.607E 01
16	3.690E 03	3.687E 03	5.590E 01	1.356E 02	1.145E 00	2.610E 01

TEST SECTION

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY POWER.DPL-140 SEC. OTHER DATA AT 20 SEC INTERVALS

SIA	PB	TE	TB	O/A	O/AP	H	DEL. TF	VS
1	3.751E 03	1.263E 02	6.290E 02	3.259E 02	8.095E 00	7.765E 00	3.705E-02	2.094E 02
2	3.750E 03	1.260E 02	6.250E 02	3.550E 02	8.085E 00	7.765E 00	3.021E-02	2.279E 02
3	3.750E 03	1.258E 02	6.290E 02	4.130E 02	8.066E 00	7.765E 00	2.001E-02	2.177E 02
SIA	L/D	CELL 1 E	LE					
1	1.063E 01	2.609E 01	5.000E 00					
2	1.476E 01	2.619E 01	5.000E 00					
3	1.477E 01	2.609E 01	5.000E 00					

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TEST 137A.5 MIN STEADY POWER-DPI-140 SEC. OTHER DATA AT 20 SEC INTERVALS

LOCAL TEST PARAMETERS

STA	P ₀	DATA POINT 2		C/A	Q/A ^P	N	DEL. TF	V _S	
		T _B	T _I						
1	3.743E-03	1.287E-02	6.523E-02	3.523E-02	0.209E-00	7.039E-00	3.097E-02	2.310E-02	0.750E-01
2	3.743E-03	1.286E-02	6.723E-02	3.723E-02	0.209E-00	7.039E-00	3.219E-02	2.453E-02	0.770E-01
3	3.743E-03	1.286E-02	7.123E-02	4.212E-02	0.186E-00	7.039E-00	2.777E-02	2.804E-02	0.790E-01

TEST 137A.5 MIN STEADY POWER-DPI-140 SEC. OTHER DATA AT 20 SEC INTERVALS

LOCAL TEST PARAMETERS

STA	P ₀	DATA POINT 3		C/A	Q/A ^P	N	DEL. TF	V _S	
		T _B	T _I						
1	3.743E-03	1.282E-02	6.463E-02	3.463E-02	0.143E-00	7.039E-00	3.043E-02	2.279E-02	0.750E-01
2	3.743E-03	1.280E-02	6.623E-02	3.671E-02	0.136E-00	7.039E-00	3.203E-02	2.391E-02	0.770E-01
3	3.743E-03	1.279E-02	7.633E-02	4.155E-02	0.120E-00	7.039E-00	2.793E-02	2.793E-02	0.790E-01

TEST 137A.5 MIN STEADY POWER-DPI-140 SEC. OTHER DATA AT 20 SEC INTERVALS

LOCAL TEST PARAMETERS

STA	P ₀	DATA POINT 4		C/A	Q/A ^P	N	DEL. TF	V _S	
		T _B	T _I						
1	3.737E-03	1.262E-02	6.393E-02	3.283E-02	0.184E-00	7.039E-00	3.093E-02	2.100E-02	0.771E-01
2	3.736E-03	1.261E-02	6.613E-02	3.603E-02	0.173E-00	7.039E-00	3.310E-02	2.303E-02	0.791E-01
3	3.736E-03	1.260E-02	7.633E-02	4.223E-02	0.155E-00	7.039E-00	2.736E-02	2.940E-02	0.803E-01

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LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY PATTERN, API-140 SEC. OTHER DATA AT 20 SEC INTERVALS

STA	PG	TE	TB	TI	C/A	DATA POINT 5		DEL TF	VS
						S/AF	N		
1	3.724E 03	1.199E 02	6.450E 02	3.491E 02	8.113E 00	7.783E 00	3.411E-02	2.293E 02	4.734E 01
2	3.734E 03	1.270E 02	6.830E 02	3.570E 02	8.193E 00	7.783E 00	3.397E-02	2.277E 02	4.734E 01
3	2.733E 03	1.357E 02	7.500E 02	4.202E 02	8.087E 00	7.783E 00	2.730E-02	2.090E 02	4.734E 01

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY PATTERN, API-140 SEC. OTHER DATA AT 20 SEC INTERVALS

STA	PG	TE	TB	TI	C/A	DATA POINT 6		DEL TF	VS
						S/AF	N		
1	3.730E 03	1.200E 02	6.436E 02	3.444E 02	8.105E 00	7.800E 00	3.473E-02	2.243E 02	4.744E 01
2	3.729E 03	1.355E 02	6.510E 02	3.549E 02	8.101E 00	7.800E 00	3.576E-02	2.181E 02	4.734E 01
3	2.729E 03	1.279E 02	7.534E 02	4.223E 02	8.117E 00	7.800E 00	2.647E-02	2.094E 02	4.734E 01

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY PATTERN, API-140 SEC. OTHER DATA AT 20 SEC INTERVALS

STA	PG	TE	TB	TI	C/A	DATA POINT 7		DEL TF	VS
						S/AF	N		
1	3.725E 03	1.199E 02	6.445E 02	3.466E 02	8.144E 00	7.800E 00	3.437E-02	2.275E 02	4.734E 01
2	3.725E 03	1.279E 02	6.610E 02	3.659E 02	8.136E 00	7.800E 00	3.277E-02	2.338E 02	4.734E 01
3	2.725E 03	1.359E 02	7.120E 02	4.261E 02	8.115E 00	7.800E 00	2.688E-02	2.093E 02	4.734E 01

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TEST 137A.5 MIN STEADY PCNTR.DPL-100 SEC. OTHER DATA AT 20 SEC INTERVALS

LOCAL TEST PARAMETERS

STA	PB	T _B	T _E	T _I	DATA POINT 8			W	W/AP	DEL. TP	VS
					G/A	W	W/AP				
1	3.723E 03	1.157E 02	6.440E 02	3.456E 02	0.144E 00	7.793E 00	3.449E -02	2.263E 02	4.723E 01		
2	3.722E 03	1.276E 02	6.533E 02	3.663E 02	0.135E 00	7.793E 00	3.230E -02	2.497E 02	4.734E 01		
2	3.722E 03	1.255E 02	7.116E 02	4.249E 02	0.116E 00	7.793E 00	2.693E -02	2.693E 02	4.756E 01		

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY PCNTR.DPL-148 SEC. OTHER DATA AT 20 SEC INTERVALS

LOCAL TEST PARAMETERS

STA	PB	T _B	T _E	T _I	DATA POINT 9			W	W/AP	DEL. TP	VS
					G/A	W	W/AP				
1	3.720E 03	1.157E 02	6.042E 02	3.433E 02	0.145E 00	7.800E 00	3.468E -02	2.233E 02	4.735E 01		
2	3.720E 03	1.277E 02	6.520E 02	3.624E 02	0.137E 00	7.800E 00	3.323E -02	2.337E 02	4.755E 01		
2	3.719E 03	1.257E 02	7.100E 02	4.306E 02	0.113E 00	7.800E 00	2.663E -02	2.931E 02	4.783E 01		

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY PCNTR.DPL-100 SEC. OTHER DATA AT 20 SEC INTERVALS

LOCAL TEST PARAMETERS

STA	PB	T _B	T _E	T _I	DATA POINT 10			W	W/AP	DEL. TP	VS
					G/A	W	W/AP				
1	3.719E 03	1.157E 02	6.410E 02	3.430E 02	0.182E 00	7.793E 00	3.462E -02	2.243E 02	4.711E 01		
2	3.719E 03	1.275E 02	6.588E 02	3.641E 02	0.094E 00	7.793E 00	3.232E -02	2.346E 02	4.727E 01		
2	3.719E 03	1.255E 02	7.119E 02	4.336E 02	0.097E 00	7.793E 00	2.662E -02	2.931E 02	4.753E 01		

TEST 137A.5 MIN STEADY POWER.DP1-140 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 11

STA	PB	T _B	T _B	T _I	C/A	Q/AP	H	DEL TF	V3
1	3.711E 03	1.193E 02	6.405E 02	3.419E 02	6.121E 00	7.774E 00	3.495E-02	2.324E 02	4.713E 01
2	3.711E 03	1.279E 02	6.570E 02	3.622E 02	8.113E 00	7.774E 00	3.312E-02	2.397E 02	4.731E 01
3	3.710E 03	1.355E 02	7.180E 02	4.341E 02	8.088E 00	7.774E 00	2.694E-02	2.986E 02	4.748E 01

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY POWER.DP1-140 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 12

STA	PB	T _B	T _B	T _I	C/A	Q/AP	H	DEL TF	V3
1	3.709E 03	1.194E 02	6.380E 02	3.407E 02	6.091E 00	7.787E 00	3.516E-02	2.213E 02	4.711E 01
2	3.709E 03	1.279E 02	6.556E 02	3.628E 02	8.093E 00	7.787E 00	3.314E-02	2.398E 02	4.722E 01
3	3.708E 03	1.354E 02	7.230E 02	4.011E 02	8.035E 00	7.787E 00	2.548E-02	3.057E 02	4.743E 01

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY POWER.DP1-140 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 13

STA	PB	T _B	T _B	T _I	C/A	Q/AP	H	DEL TF	V3
1	3.701E 03	1.195E 02	6.410E 02	3.455E 02	6.059E 00	7.758E 00	3.410E-02	2.273E 02	4.708E 01
2	3.701E 03	1.259E 02	6.570E 02	3.646E 02	8.051E 00	7.758E 00	3.250E-02	2.387E 02	4.804E 01
3	3.700E 03	1.338E 02	7.440E 02	4.666E 02	8.014E 00	7.758E 00	2.331E-02	3.328E 02	4.828E 01

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY POWER, DP1-140 SEC. OTHER DATA AT 20 SEC. INTERVALS

DATA POINT 14									
STA	PG	W	TB	T1	G/A	G/AP	N	BL	WP
1	3.690E 03	1.175E 02	6.300E 02	3.412E 02	8.072E 00	7.732E 00	3.472E-02	2.232E 02	4.617E 01
2	3.690E 03	1.200E 02	6.910E 02	3.847E 02	8.672E 00	7.732E 00	3.507E-02	2.302E 02	4.633E 01
3	3.690E 03	1.212E 02	6.980E 02	4.132E 02	8.054E 00	7.732E 00	2.742E-02	2.732E 02	4.639E 01

LOCAL TEST PARAMETERS

TEST 137A.5 MIN STEADY POWER, DP1-140 SEC. OTHER DATA AT 20 SEC. INTERVALS

DATA POINT 15									
STA	PG	W	TB	T1	G/A	G/AP	N	BL	WP
1	3.690E 03	1.175E 02	6.410E 02	3.444E 02	8.077E 00	7.737E 00	3.481E-02	2.272E 02	4.670E 01
2	3.690E 03	1.200E 02	6.910E 02	3.969E 02	8.669E 00	7.737E 00	3.197E-02	2.452E 02	4.633E 01
3	3.690E 03	1.212E 02	7.030E 02	4.170E 02	8.052E 00	7.737E 00	2.741E-02	2.632E 02	4.639E 01

LOCAL TEST PARAMETERS

DATA POINT 16									
STA	PG	W	TB	T1	G/A	G/AP	N	BL	WP
1	3.690E 03	1.175E 02	6.300E 02	3.360E 02	8.101E 00	7.700E 00	3.450E-02	2.131E 02	4.677E 01
2	3.690E 03	1.187E 02	6.500E 02	3.660E 02	8.686E 00	7.700E 00	3.264E-02	2.307E 02	4.734E 01
3	3.690E 03	1.200E 02	7.000E 02	4.130E 02	8.071E 00	7.700E 00	2.773E-02	2.503E 02	4.633E 01

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 137B.80 AT DF 11,DP1-120 SEC,DP11-310 SEC,CITER DATA 20 SEC INTERVA

AF = 0.273E-03 D = 0.212E-01 L = 0.500E 01 DELTA TO = 0.700E 00

DATA POINTS

POINT	PB-1N	PB-0LT	TB-1N	TB-DUT	N	E2	12	GP	HT BAL.	G
1	3.709E 03	3.707E 03	1.011E 02	1.409E 02	1.135E 00	2.625E 01	1.116E 03	2.777E 01	-2.358E 00	4.158E 03
2	3.703E 03	3.701E 03	1.009E 02	1.013E 02	1.139E 00	2.626E 01	1.116E 03	2.783E 01	-4.073E 00	4.165E 03
3	3.697E 03	3.695E 03	1.009E 02	1.412E 02	1.139E 00	2.621E 01	1.116E 03	2.768E 01	-4.381E 00	4.165E 03
4	3.689E 03	3.687E 03	1.004E 02	1.006E 02	1.144E 00	2.619E 01	1.116E 03	2.771E 01	-4.456E 00	4.163E 03
5	3.683E 03	3.683E 03	1.002E 02	1.004E 02	1.144E 00	2.622E 01	1.112E 03	2.769E 01	-6.708E 00	4.163E 03
6	3.678E 03	3.674E 03	1.001E 02	1.007E 02	1.144E 00	2.627E 01	1.117E 03	2.782E 01	-5.096E 00	4.163E 03
7	3.675E 03	3.673E 03	1.002E 02	1.010E 02	1.143E 00	2.631E 01	1.116E 03	2.784E 01	-5.469E 00	4.173E 03
8	3.618E 03	3.716E 03	9.970E 01	1.003E 02	1.148E 00	2.630E 01	1.116E 03	2.780E 01	-5.525E 00	4.197E 03
9	3.696E 03	3.694E 03	5.906E 01	1.004E 02	1.146E 00	2.622E 01	1.112E 03	2.764E 01	-6.476E 00	4.199E 03
10	3.692E 03	3.690E 03	5.900E 01	1.011E 02	1.141E 00	2.628E 01	1.115E 03	2.778E 01	-6.549E 00	4.172E 03
11	3.712E 03	3.710E 03	5.880E 01	1.009E 02	1.141E 00	2.654E 01	1.125E 03	2.871E 01	-2.732E 00	4.172E 03

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 1370.00 AT DP 11.0DP1-120 SEC.,DP11-318 SEC.,OTHER DATA 20 SEC. INTERVAL

DATA POINT 1

STA	PB	TB	TU	T1	Q/A	Q/AP	H	DEL TF	V3
1	3.700E 03	1.230E 02	6.250E 02	3.210E 02	8.197E 00	7.091E 00	3.094E-02	1.090E 02	4.730E 01
2	3.700E 03	1.250E 02	6.420E 02	3.410E 02	8.180E 00	7.091E 00	3.074E-02	2.100E 02	4.730E 01
3	3.700E 03	1.260E 02	6.630E 02	3.600E 02	8.160E 00	7.091E 00	3.054E-02	2.510E 02	4.771E 01
STA	L/D	DELTA E	LE						
1	1.003E 01	2.620E 01	5.600E 00						
2	1.070E 01	2.650E 01	5.600E 00						
3	1.070E 01	2.650E 01	5.600E 00						

LOCAL TEST PARAMETERS

TEST 1370.30 AT DP 11.0DP1-120 SEC.,DP11-318 SEC.,OTHER DATA 20 SEC. INTERVAL

DATA POINT 2

STA	PB	TB	TU	T1	Q/A	Q/AP	H	DEL TF	V3
1	3.702E 03	1.221E 02	6.380E 02	3.360E 02	8.197E 00	7.090E 00	3.097E-02	2.133E 02	4.730E 01
2	3.701E 03	1.212E 02	6.360E 02	3.350E 02	8.180E 00	7.090E 00	3.087E-02	2.240E 02	4.772E 01
3	3.701E 03	1.293E 02	6.590E 02	3.960E 02	8.170E 00	7.090E 00	3.081E-02	2.597E 02	4.770E 01
STA	L/D	DELTA E	LE						
1	1.003E 01	2.630E 01	5.600E 00						
2	1.070E 01	2.620E 01	5.600E 00						
3	1.070E 01	2.620E 01	5.600E 00						

LOCAL TEST PARAMETERS

TEST 1370.30 AT DP 11.0DP1-120 SEC.,DP11-318 SEC.,OTHER DATA 20 SEC. INTERVAL

DATA POINT 3

STA	PB	TB	TU	T1	Q/A	Q/AP	H	DEL TF	V3
1	3.696E 03	1.331E 02	6.300E 02	3.320E 02	8.160E 00	7.060E 00	3.068E-02	2.090E 02	4.730E 01
2	3.695E 03	1.311E 02	6.250E 02	3.657E 02	8.150E 00	7.060E 00	3.043E-02	2.243E 02	4.772E 01
3	3.695E 03	1.362E 02	6.670E 02	3.960E 02	8.140E 00	7.060E 00	3.035E-02	2.566E 02	4.789E 01
STA	L/D	DELTA E	LE						
1	1.003E 01	2.621E 01	5.600E 00						
2	1.070E 01	2.621E 01	5.600E 00						
3	1.070E 01	2.621E 01	5.600E 00						

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LOCAL TEST PARAMETERS

TEST 1378.00 AT DP 11.DP1-120 SEC.,DP11-310 SEC.,OTHER DATA 20 SEC. INTERVAL

DATA POINT 4

STA	PB	TB	TG	TU	T1	Q/A	Q/AP	H	DEL TF	V5
1	3.66E 03	1.22E 02	6.38E 02	3.37E 02	0.132E 00	7.87E 00	2.92E-02	2.69E 02	4.77E 01	
2	3.67E 03	1.23E 02	6.37E 02	3.36E 02	0.144E 00	7.87E 00	3.41E-02	2.36E 02	4.77E 01	
3	3.67E 03	1.23E 02	6.37E 02	3.36E 02	0.132E 00	7.87E 00	3.62E-02	2.69E 02	4.80E 01	
STA	L/D	DELTA E	LE							
1	1.66E 01	2.41E 01	5.00E 00							
2	1.67E 01	2.61E 01	5.00E 00							
3	1.67E 01	2.61E 01	5.00E 00							

LOCAL TEST PARAMETERS

TEST 1378.00 AT DP 11.DP1-120 SEC.,DP11-310 SEC.,OTHER DATA 20 SEC. INTERVAL

DATA POINT 5

STA	PB	TB	TG	TU	T1	Q/A	Q/AP	H	DEL TF	V5
1	3.66E 03	1.22E 02	6.37E 02	3.34E 02	0.172E 00	7.86E 00	3.671E-02	2.132E 02	4.77E 01	
2	3.67E 03	1.23E 02	6.36E 02	3.35E 02	0.161E 00	7.86E 00	3.365E-02	2.334E 02	4.77E 01	
3	3.67E 03	1.23E 02	6.37E 02	3.36E 02	0.152E 00	7.86E 00	3.610E-02	2.669E 02	4.80E 01	
STA	L/D	DELTA E	LE							
1	1.66E 01	2.63E 01	5.00E 00							
2	1.67E 01	2.63E 01	5.00E 00							
3	1.67E 01	2.62E 01	5.00E 00							

LOCAL TEST PARAMETERS

TEST 1378.00 AT DP 11.DP1-120 SEC.,DP11-310 SEC.,OTHER DATA 20 SEC. INTERVAL

DATA POINT 6

STA	PB	TB	TG	TU	T1	Q/A	Q/AP	H	DEL TF	V5
1	3.671E 03	1.22E 02	6.40E 02	3.36E 02	0.202E 00	7.90E 00	3.657E-02	2.162E 02	4.77E 01	
2	3.672E 03	1.23E 02	6.39E 02	3.461E 02	0.191E 00	7.90E 00	3.354E-02	2.356E 02	4.77E 01	
3	3.672E 03	1.23E 02	6.39E 02	3.361E 02	0.181E 00	7.90E 00	3.647E-02	2.594E 02	4.80E 01	
STA	L/D	DELTA E	LE							
1	1.66E 01	2.62E 01	5.00E 00							
2	1.67E 01	2.62E 01	5.00E 00							
3	1.67E 01	2.62E 01	5.00E 00							

LOCAL TEST PARAMETERS

TEST 1378.00 AT DP 11.DP1-120 SEC.,DP11-310 SEC.,OTHER DATA 20 SEC. INTERVAL

DATA POINT 7

STA	PB	TB	TG	TU	T1	Q/A	Q/AP	H	DEL TF	V5
1	3.674E 03	1.22E 02	6.41E 02	3.38E 02	0.227E 00	7.90E 00	3.659E-02	2.162E 02	4.77E 01	
2	3.674E 03	1.23E 02	6.43E 02	3.673E 02	0.215E 00	7.90E 00	3.341E-02	2.367E 02	4.77E 01	
3	3.674E 03	1.23E 02	6.43E 02	4.007E 02	0.205E 00	7.90E 00	3.012E-02	2.617E 02	4.80E 01	
STA	L/D	DELTA E	LE							
1	1.66E 01	2.62E 01	5.00E 00							
2	1.67E 01	2.63E 01	5.00E 00							
3	1.67E 01	2.63E 01	5.00E 00							

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LOCAL TEST PARAMETERS

TEST 1378.00 AT OP 11.DP11-120 SEC.CPT11-318 SEC.OTHER DATA 20 SEC. INTerva

DATA POINT 8								
STA	PB	TB	TU	T1	C/A	O/AP	H	DEL TF
1	3.672E 03	1.226E 02	6.500E 02	3.499E 02	8.216E 00	7.893E 00	3.488E -02	2.278E 02
2	3.692E 03	1.324E 02	6.640E 02	3.665E 02	8.209E 00	7.893E 00	3.341E -02	2.354E 02
3	3.711E 03	1.323E 02	6.690E 02	3.942E 02	8.193E 00	7.893E 00	3.063E -02	2.578E 02

LOCAL TEST PARAMETERS

TEST 1378.00 AT OP 11.DP11-120 SEC.CPT11-318 SEC.OTHER DATA 20 SEC. INTerva

DATA POINT 9								
STA	PB	TB	TU	T1	C/A	O/AP	H	DEL TF
1	3.695E 03	1.228E 02	6.499E 02	3.499E 02	8.167E 00	7.894E 00	3.454E -02	2.274E 02
2	3.694E 03	1.302E 02	6.640E 02	3.683E 02	8.159E 00	7.894E 00	3.293E -02	2.303E 02
3	3.694E 03	1.300E 02	6.590E 02	3.993E 02	C.15CE 00	7.894E 00	3.016E -02	2.609E 02

LOCAL TEST PARAMETERS

TEST 1378.00 AT OP 11.DP11-120 SEC.CPT11-318 SEC.OTHER DATA 20 SEC. INTerva

DATA POINT 10								
STA	PB	TB	TU	T1	C/A	O/AP	H	DEL TF
1	3.691E 03	1.226E 02	6.500E 02	3.503E 02	8.209E 00	7.893E 00	3.468E -02	2.278E 02
2	3.690E 03	1.308E 02	6.640E 02	3.710E 02	8.193E 00	7.893E 00	3.273E -02	2.416E 02
3	3.690E 03	1.300E 02	6.590E 02	3.993E 02	8.197E 00	7.893E 00	3.022E -02	2.612E 02

LOCAL TEST PARAMETERS

TEST 1378.00 AT OP 11.DP11-120 SEC.CPT11-318 SEC.OTHER DATA 20 SEC. INTerva

DATA POINT 11								
STA	PB	TB	TU	T1	C/A	O/AP	H	DEL TF
1	3.711E 03	1.211E 02	6.448E 02	3.414E 02	8.347E 00	8.043E 00	3.083E -02	2.303E 02
2	3.711E 03	1.292E 02	6.680E 02	3.654E 02	8.356E 00	8.043E 00	3.463E -02	2.363E 02
3	3.710E 03	1.373E 02	6.440E 02	3.943E 02	8.347E 00	8.043E 00	3.163E -02	2.593E 02

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L10105 SITE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 136.00 AT 009(295 SEC).DPI-136 SEC. OTHER DATA AT 20 SEC INTERVALS

$\Delta F = C_{136.00} - 0 = 0.132E-01$ $L = 0.500E-01$ $\Delta LTA_TB = 0.100E-01$

DATA POINTS

POINT	PB-1A	PB-OUT	TB-IN	TB-OUT	TB	W	E2	E1	12	10	WT. GDL.
1	3.644E-03	3.557E-03	5.910E-01	1.530E-02	1.170E-00	3.710E-03	1.137E-03	1.054E-03	3.397E-01	3.397E-01	3.397E-01
2	3.639E-03	3.549E-03	5.873E-01	1.521E-02	1.162E-00	3.683E-03	1.126E-03	1.051E-03	3.391E-01	3.391E-01	3.391E-01
3	3.636E-03	3.546E-03	5.860E-01	1.527E-02	1.170E-00	3.679E-03	1.123E-03	1.050E-03	3.389E-01	3.389E-01	3.389E-01
4	3.630E-03	3.539E-03	5.803E-01	1.531E-02	1.182E-00	3.669E-03	1.113E-03	1.040E-03	3.385E-01	3.385E-01	3.385E-01
5	3.626E-03	3.533E-03	5.823E-01	1.527E-02	1.182E-00	3.659E-03	1.103E-03	1.030E-03	3.381E-01	3.381E-01	3.381E-01
6	3.623E-03	3.532E-03	5.793E-01	1.529E-02	1.193E-00	3.700E-03	1.093E-03	1.020E-03	3.377E-01	3.377E-01	3.377E-01
7	3.624E-03	3.532E-03	5.793E-01	1.631E-02	1.189E-00	3.700E-03	1.093E-03	1.020E-03	3.377E-01	3.377E-01	3.377E-01
8	3.623E-03	3.531E-03	5.793E-01	1.549E-02	1.192E-00	3.700E-03	1.093E-03	1.020E-03	3.377E-01	3.377E-01	3.377E-01
9	3.622E-03	3.527E-03	5.777E-01	1.544E-02	1.192E-00	3.700E-03	1.093E-03	1.020E-03	3.377E-01	3.377E-01	3.377E-01

TEST SECTION

LOCAL TEST PARAMETERS

TEST 136.00 AT 009(295 SEC).DPI-136 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 1

STA	PB	PB	TB	TB	W	T1	C/A	H	DEL_TP	V5
1	2.579E-03	1.359E-02	5.746E-02	4.092E-02	1.601E-01	1.603E-01	5.653E-02	2.693E-02	5.747E-01	5.747E-01
2	3.561E-03	1.568E-02	5.610E-02	4.317E-02	1.689E-01	1.689E-01	5.707E-01	2.699E-02	5.804E-01	5.804E-01

DATA POINT 2

STA	L/D	DELTAE	LE	W	T1	C/A	H	DEL_TP	V5
1	2.358E-01	3.715E-01	5.000E-00	1.603E-01	1.603E-01	5.653E-02	2.693E-02	5.747E-01	5.747E-01
2	2.587E-01	3.715E-01	5.000E-00	1.603E-01	1.603E-01	5.707E-01	2.699E-02	5.804E-01	5.804E-01

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LOCAL TEST PARAMETERS

TEST 130.80 AT 0P9(295 SEC) 0P1-135 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 2

STA	PB	T _B	T _A	T _B	T _A	G/A	G/AP	H	DEL TF	V _S
1	3.572E 03	1.390E 02	5.660E 02	4.050E 02	1.653E 01	1.578E 01	5.820E-02	2.707E 02	0.003E 01	
2	3.553E 03	1.498E 02	9.820E 02	4.309E 02	1.652E 01	1.578E 01	5.515E-02	2.616E 02	0.002E 01	
STA	L/D	DELTA E	LE							
1	2.352E 01	3.663E C1	5.000E 00							
2	2.587E 01	3.663E C1	5.000E 00							

LOCAL TEST PARAMETERS

TEST 130.80 AT 0P9(295 SEC) 0P1-135 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 3

STA	PB	T _B	T _A	T _B	T _A	G/A	G/AP	H	DEL TF	V _S
1	3.569E 03	1.392E 02	5.663E 02	4.079E 02	1.655E 01	1.580E 01	5.909E-02	2.647E 02	0.030E 01	
2	3.551E 03	1.500E 02	9.650E 02	4.316E 02	1.653E 01	1.580E 01	5.637E-02	2.817E 02	0.073E 01	
STA	L/D	DELTA E	LE							
1	2.356E 01	3.652E C1	5.000E 00							
2	2.587E 01	3.652E C1	5.000E 00							

LOCAL TEST PARAMETERS

TEST 130.80 AT 0P9(295 SEC) 0P1-135 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 4

STA	PB	T _B	T _A	T _B	T _A	G/A	G/AP	H	DEL TF	V _S
1	3.565E 03	1.393E 02	5.671E 02	4.116E 02	1.656E 01	1.592E 01	5.650E-02	2.724E 02	0.004E 01	
2	3.547E 03	1.504E 02	9.670E 02	4.339E 02	1.653E 01	1.592E 01	5.630E-02	2.823E 02	0.010E 01	
STA	L/D	DELTA E	LE							
1	2.356E 01	3.652E C1	5.000E 00							
2	2.587E 01	3.652E C1	5.000E 00							

LOCAL TEST PARAMETERS

TEST 130.80 AT 0P9(295 SEC) 0P1-135 SEC. OTHER DATA AT 20 SEC INTERVALS

DATA POINT 5

STA	PB	T _B	T _A	T _B	T _A	G/A	G/AP	H	DEL TF	V _S
1	3.567E 03	1.391E 02	5.670E 02	4.130E 02	1.654E 01	1.594E 01	5.797E-02	2.737E 02	0.005E 01	
2	3.543E 03	1.503E 02	9.651E 02	4.379E 02	1.651E 01	1.591E 01	5.811E-02	2.879E 02	0.010E 01	
STA	L/D	DELTA E	LE							
1	2.356E 01	3.652E C1	5.000E 00							
2	2.587E 01	3.652E C1	5.000E 00							

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LOCAL TEST PARAMETERS

TEST 138.00 AT 0001205 SEC(1.001-135 SEC. OTHER DATA AT 20 SEC INTERVALS

STA	PG	T0	DATA POINT 3					
			T0	T1	Q/A	Q/AP	N	DEL TP
1	3.654E 03	1.304E 02	9.600E 02	9.710E 02	1.071E 01	1.000E 01	5.000E-03	2.000E 02
2	3.637E 03	1.304E 02	9.600E 02	9.732E 02	1.072E 01	1.000E 01	5.732E-03	1.000E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	3.764E 01	5.600E 00					
2	2.987E 01	3.764E 01	5.600E 00					

LOCAL TEST PARAMETERS

TEST 138.00 AT 0001205 SEC(1.001-135 SEC. OTHER DATA AT 20 SEC INTERVALS

STA	PG	T0	DATA POINT 7					
			T0	T1	Q/A	Q/AP	N	DEL TP
1	3.654E 03	1.303E 02	9.530E 02	9.370E 02	1.071E 01	1.000E 01	5.000E-02	2.000E 02
2	3.637E 03	1.303E 02	9.530E 02	9.901E 02	1.072E 01	1.000E 01	6.000E-02	3.000E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	3.765E 01	5.600E 00					
2	2.987E 01	3.765E 01	5.600E 00					

LOCAL TEST PARAMETERS

TEST 138.00 AT 0001205 SEC(1.001-135 SEC. OTHER DATA AT 20 SEC INTERVALS

STA	PG	T0	DATA POINT 9					
			T0	T1	Q/A	Q/AP	N	DEL TP
1	3.654E 03	1.400E 02	9.630E 02	9.374E 02	1.072E 01	1.000E 01	5.000E-02	2.000E 02
2	3.637E 03	1.312E 02	9.446E 02	9.750E 02	1.074E 01	1.000E 01	7.113E-02	3.000E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	3.765E 01	5.600E 00					
2	2.987E 01	3.765E 01	5.600E 00					

LOCAL TEST PARAMETERS

TEST 138.00 AT 0001205 SEC(1.001-135 SEC. OTHER DATA AT 20 SEC INTERVALS

STA	PG	T0	DATA POINT 9					
			T0	T1	Q/A	Q/AP	N	DEL TP
1	3.551E 03	1.400E 02	1.000E 03	9.500E 02	1.074E 01	1.000E 01	5.130E-02	3.000E 02
2	3.532E 03	1.514E 02	9.670E 02	9.620E 02	1.077E 01	1.000E 01	6.300E-02	2.000E 02
STA	L/D	DELTA E	LE					
1	2.358E 01	3.709E 01	5.600E 00					
2	2.987E 01	3.709E 01	5.600E 00					

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Liquid Side Heat Transfer Test Data

OVERALL TEST PARAMETERS

TEST 139 STAINLESS STEEL BURNDOWN DATA POINT 3 IS BURNDOWN

$\Delta F = 0.129E-03$ $0 = 0.122E-01$ $L = 0.450E-01$ $\text{DELTAD} = 0.110E-01$

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	E2	12	CP	HT SUL.
1	9.120E-02	8.690E-02	9.410E-01	9.380E-01	1.180E-00	7.460E-00	4.693E-02	3.417E-00	1.331E-00
2	9.650E-02	8.500E-02	9.330E-01	9.320E-01	1.180E-00	2.520E-01	1.240E-03	2.000E-01	1.170E-00
3	9.800E-02	8.660E-02	9.270E-01	9.270E-01	1.180E-00	3.010E-01	1.410E-03	4.034E-01	1.490E-00

TEST SECTION - LOCAL TEST PARAMETERS

TEST 139 STAINLESS STEEL BURNDOWN DATA POINT 3 IS BURNDOWN

DATA POINT 1

STA	PB	TB	TW	T1	Q/A	Q/A/P	H	GCL TF	V3
1	8.800E-02	9.822E-01	1.090E-02	1.240E-02	1.050E-00	1.300E-00	5.000E-02	2.000E-01	1.031E-02
2	8.714E-02	9.940E-01	1.070E-02	1.220E-02	1.050E-00	1.340E-00	6.730E-02	2.330E-01	1.032E-02

DATA POINT 2

STA	PB	TB	TW	T1	Q/A	Q/A/P	H	GCL TF	V3
1	8.653E-02	1.227E-02	7.890E-02	3.380E-02	1.421E-01	1.360E-01	6.364E-02	2.151E-02	1.047E-02
2	8.931E-02	1.319E-02	7.870E-02	3.352E-02	1.422E-01	1.360E-01	6.735E-02	2.033E-02	1.061E-02

DATA POINT 3

STA	PB	TB	TW	T1	Q/A	Q/A/P	H	GCL TF	V3
1	8.711E-02	1.326E-02	9.040E-02	3.070E-02	1.057E-01	1.057E-01	7.202E-02	2.350E-02	1.054E-02
2	8.622E-02	1.448E-02	9.670E-02	3.000E-02	1.059E-01	1.057E-01	7.090E-02	2.412E-02	1.055E-02

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DIMENSIONLESS PARAMETERS

TEST 139 STAINLESS STEEL BUMPER DATA POINT 3 IS BUMPER

DATA POINT	STA	IN	PF	RE	T1/T0	MU/PF(=1)
1	1	1.1141E 03	0.1990E 00	1.8217E 02	1.0472E 00	6.2812E 02
1	2	1.2794E 03	0.1632E 00	1.8651E 02	1.0416E 00	7.2167E 02
1	1	1.1615E 03	0.4121E 00	2.1829E 02	1.3691E 00	7.1693E 02
2	1	1.2121E 03	0.1613E 00	2.3163E 02	1.3434E 00	7.6346E 02
2	2	1.2121E 03	0.1613E 00	2.3163E 02	1.3434E 00	7.6346E 02
3	1	1.2116E 03	0.1613E 00	2.3163E 02	1.3434E 00	7.6346E 02
3	2	1.2116E 03	0.4099E 00	2.4695E 02	1.3793E 00	8.6761E 02

DATA POINT	STA	PRO RATIO	K RATIO	MU RATIO	CP RATIO	MU/PF(=1)
1	1	1.0111E 00	9.6842E -01	1.2048E 00	1.0035E 00	1.0035E 00
1	2	1.0094E 00	9.6935E -01	1.1764E 00	1.0032E 00	1.0032E 00
2	1	1.1913E 00	9.6935E -01	2.0773E 00	1.0012E 00	1.0012E 00
2	2	1.0953E 00	0.7239E -01	2.4993E 00	9.9941E -01	9.9941E -01
3	1	1.1231E 00	0.7044E -01	2.5947E 00	1.0057E 00	1.0057E 00
3	2	1.1161E 00	0.8977E -01	2.7000E 00	1.0036E 00	1.0036E 00

DATA POINT	STA	MU(F)	PF(F)	RE(F)	T1/TF	MU/PF(=1)
1	1	1.0917E 03	3.7444E 00	1.9967E 05	1.0233E 00	6.4364E 02
1	2	1.2320E 03	3.7594E 00	1.9922E 05	1.0294E 00	7.3711E 02
1	1	1.0327E 03	1.7544E 00	3.6712E 05	1.1358E 00	8.2473E 02
2	1	1.0910E 03	1.7293E 00	3.7295E 05	1.1466E 00	8.7828E 02
2	2	1.1649E 03	1.5444E 00	4.0854E 05	1.1771E 00	9.7919E 02
3	1	1.2236E 03	1.5111E 00	4.1021E 05	1.1803E 00	1.0416E 03
3	2					

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TEST DATA

OCCUPATIONAL TESTS

DELTA TO = 0e+000Z 01
J = 0e+000Z 01

DATA SELECT

TEST SECTION

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER.DP1-143SEC.DP11-713SEC.1 MIN DATA INTERVAL

STA	PB	T _B	T _A	DATA POINT 1		H	DEL.TP	VS
				T _U	T _I			
1	6.792E 02	1.192E 02	7.880E 02	3.400E 02	1.390E 01	1.340E 01	6.130E-02	2.217E 02
2	6.638E 02	1.262E 02	7.930E 02	3.861E 02	1.392E 01	1.360E 01	5.900E-02	2.270E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.507E 01	4.580E 00					
2	2.760E 01	2.867E 01	4.580E 00					

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER.DP1-143SEC.DP11-713SEC.1 MIN DATA INTERVAL

STA	PB	T _B	T _A	DATA POINT 2		H	DEL.TP	VS
				T _U	T _I			
1	6.773E 02	1.193E 02	7.882E 02	3.471E 02	1.390E 01	1.376E 01	6.230E-02	2.170E 02
2	6.627E 02	1.263E 02	7.933E 02	3.862E 02	1.393E 01	1.358E 01	5.917E-02	2.190E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.506E 01	4.580E 00					
2	2.760E 01	2.866E 01	4.580E 00					

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER.DP1-143SEC.DP11-713SEC.1 MIN DATA INTERVAL

STA	PB	T _B	T _A	DATA POINT 3		H	DEL.TP	VS
				T _U	T _I			
1	6.739E 02	1.185E 02	7.880E 02	3.328E 02	1.392E 01	1.351E 01	6.111E-02	2.216E 02
2	6.588E 02	1.275E 02	7.940E 02	3.861E 02	1.390E 01	1.351E 01	5.916E-02	2.260E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.500E 01	4.580E 00					
2	2.760E 01	2.500E 01	4.580E 00					

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER.DP1-143SEC.DP11-713SEC.1 MIN DATA INTERVAL

STA	PB	T _B	T _A	DATA POINT 4		H	DEL.TP	VS
				T _U	T _I			
1	6.693E 02	1.182E 02	7.880E 02	3.423E 02	1.391E 01	1.351E 01	6.055E-02	2.241E 02
2	6.547E 02	1.272E 02	7.930E 02	3.874E 02	1.384E 01	1.351E 01	5.857E-02	2.300E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.500E 01	4.580E 00					
2	2.760E 01	2.500E 01	4.580E 00					

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER,DP1-143SEC,DP11-713SEC,1 MIN DATA INTERVAL.

DATA POINT 5								
STA	PG	T _B	T _A	T _V	T _I	G/A	G/AP	H
1	0.656E 02	1.179E 02	7.632E 02	3.637E 02	1.390E 01	1.351E 01	0.932E 02	2.237E 02
2	0.516E 02	1.270E 02	7.930E 02	3.584E 02	1.384E 01	1.351E 01	0.827E 02	2.318E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.500E 01	4.900E 00					
2	2.760E 01	2.500E 01	4.900E 00					

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER,DP1-143SEC,DP11-713SEC,1 MIN DATA INTERVAL.

DATA POINT 6								
STA	PG	T _B	T _A	T _V	T _I	G/A	G/AP	H
1	0.674E 02	1.178E 02	7.644E 02	3.419E 02	1.394E 01	1.352E 01	0.935E 02	2.244E 02
2	0.597E 02	1.263E 02	7.908E 02	3.871E 02	1.388E 01	1.352E 01	0.801E 02	2.307E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.501E 01	4.900E 00					
2	2.760E 01	2.501E 01	4.900E 00					

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER,DP1-143SEC,DP11-713SEC,1 MIN DATA INTERVAL.

DATA POINT 7								
STA	PG	T _B	T _A	T _V	T _I	G/A	G/AP	H
1	0.698E 02	1.171E 02	7.636E 02	3.468E 02	1.394E 01	1.357E 01	0.931E 02	2.237E 02
2	0.558E 02	1.252E 02	7.936E 02	3.594E 02	1.388E 01	1.357E 01	0.813E 02	2.334E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.500E 01	4.900E 00					
2	2.760E 01	2.500E 01	4.900E 00					

LOCAL TEST PARAMETERS

TEST140.9.5MIN STEADY POWER,DP1-143SEC,DP11-713SEC,1 MIN DATA INTERVAL.

DATA POINT 8								
STA	PG	T _B	T _A	T _V	T _I	G/A	G/AP	H
1	0.671E 02	1.164E 02	7.630E 02	3.459E 02	1.376E 01	1.338E 01	0.908E 02	2.230E 02
2	0.532E 02	1.230E 02	7.930E 02	3.568E 02	1.384E 01	1.338E 01	0.777E 02	2.332E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.500E 01	4.900E 00					
2	2.760E 01	2.500E 01	4.900E 00					

LOCAL TEST PARAMETERS

TEST140-9.5MIN STEADY POWER-OP1-143SEC-DP11-713SEC-1 MIN DATA INTERVAL

DATA POINT 9							
STA	PB	TB	TU	T1	O/A	G/AP	H
1	0.631E 02	1.164E 02	7.888E 02	3.649E 02	1.389E 01	1.347E 01	5.985E 02
2	0.486E 02	1.258E 02	7.938E 02	3.698E 02	1.381E 01	1.347E 01	5.738E 02
STA	L/O	CELTAE	LE				
1	2.111E 01	2.498E 01	4.568E 00				
2	2.760E 01	2.498E 01	4.568E 00				

LOCAL TEST PARAMETERS

TEST140-9.5MIN STEADY POWER-OP1-143SEC-DP11-713SEC-1 MIN DATA INTERVAL

DATA POINT 10							
STA	PB	TB	TU	T1	O/A	G/AP	H
1	0.570E 02	1.179E 02	7.888E 02	3.670E 02	1.389E 01	1.351E 01	5.985E 02
2	0.427E 02	1.270E 02	7.938E 02	3.683E 02	1.381E 01	1.351E 01	5.738E 02
STA	L/O	CELTAE	LE				
1	2.111E 01	2.501E 01	4.568E 00				
2	2.760E 01	2.501E 01	4.568E 00				

LOCAL TEST PARAMETERS

TEST140-9.5MIN STEADY POWER-OP1-143SEC-DP11-713SEC-1 MIN DATA INTERVAL

DATA POINT 11							
STA	PB	TB	TU	T1	O/A	G/AP	H
1	0.574E 02	1.185E 02	7.888E 02	3.680E 02	1.389E 01	1.354E 01	5.985E 02
2	0.419E 02	1.277E 02	7.938E 02	3.694E 02	1.381E 01	1.354E 01	5.738E 02
STA	L/O	CELTAE	LE				
1	2.111E 01	2.503E 01	4.568E 00				
2	2.760E 01	2.503E 01	4.568E 00				

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 1.0 MIN STEADY POWER, DPL=2485SEC, DPP=10-75SEC, OTHER INTERVALS 1 MIN

$AF = 0.129E-03$ $D = 0.129E-01$ $L = 0.450E-01$ $\Delta T_{TO} = 0.220E-01$

DATA POINTS

POINT	PG-IN	PG-OUT	TG-IN	TG-OUT	W	E1	E2	E3	E4	E5	E6	WT SAL
1	9.100E-02	0.468E-02	9.390E-01	1.037E-02	1.037E-00	2.050E-01	1.036E-01	3.069E-01	3.069E-01	1.300E-00	6	0.100E-03
2	9.090E-02	0.440E-02	9.490E-01	1.047E-02	1.047E-00	2.050E-01	1.036E-01	3.069E-01	3.069E-01	1.300E-00	7	0.100E-03
3	9.050E-02	0.410E-02	9.490E-01	1.050E-02	1.050E-00	2.050E-01	1.036E-01	3.069E-01	3.069E-01	1.300E-00	8	0.100E-03
4	9.110E-02	0.391E-02	9.390E-01	1.040E-02	1.040E-00	2.050E-01	1.036E-01	3.069E-01	3.069E-01	1.300E-00	9	0.100E-03
5	9.070E-02	0.371E-02	9.390E-01	1.036E-02	1.036E-00	2.050E-01	1.036E-01	3.069E-01	3.069E-01	1.300E-00	10	0.100E-03
6	9.030E-02	0.350E-02	9.260E-01	1.032E-02	1.032E-00	2.050E-01	1.036E-01	3.067E-01	3.067E-01	1.300E-00	11	0.100E-03
7	9.000E-02	0.329E-02	9.220E-01	1.028E-02	1.028E-00	2.050E-01	1.036E-01	3.066E-01	3.066E-01	1.300E-00	12	0.100E-03
8	9.060E-02	0.300E-02	9.180E-01	1.024E-02	1.024E-00	2.050E-01	1.036E-01	3.063E-01	3.063E-01	1.300E-00	13	0.100E-03
9	9.030E-02	0.273E-02	9.160E-01	1.020E-02	1.020E-00	2.050E-01	1.036E-01	3.067E-01	3.067E-01	1.300E-00	14	0.100E-03
10	9.000E-02	0.246E-02	9.170E-01	1.016E-02	1.016E-00	2.050E-01	1.036E-01	3.067E-01	3.067E-01	1.300E-00	15	0.100E-03

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TEST SECTION

LOCAL TEST PARAMETERS

TEST141,9MIN STEADY POWER,DPI-2445SEC,DPD-16-75SEC,OTHER INTERVALS 1 MIN

STA	P _D	T _B	DATA POINT 1			H	GCL TV	V _S
			T ₁	G/A	G/AP			
1	0.635E 02	1.300E 02	0.300E 02	0.030E 02	1.723E 01	1.660E 01	0.103E-02	2.773E 02
2	0.490E 02	1.411E 02	0.450E 02	0.031E 02	1.713E 01	1.670E 01	0.003E-02	2.660E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.050E 01	0.500E 00					
2	2.760E 01	2.050E 01	0.500E 00					

LOCAL TEST PARAMETERS

TEST141,9MIN STEADY POWER,DPI-2445SEC,DPD-16-75SEC,OTHER INTERVALS 1 MIN

STA	P _D	T _B	DATA POINT 2			H	GCL TV	V _S
			T ₁	G/A	G/AP			
1	0.621E 02	1.304E 02	0.330E 02	0.030E 02	1.727E 01	1.660E 01	0.103E-02	2.774E 02
2	0.476E 02	1.419E 02	0.440E 02	0.030E 02	1.713E 01	1.670E 01	0.003E-02	2.660E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.050E 01	0.500E 00					
2	2.760E 01	2.050E 01	0.500E 00					

LOCAL TEST PARAMETERS

TEST141,9MIN STEADY POWER,DPI-2445SEC,DPD-16-75SEC,OTHER INTERVALS 1 MIN

STA	P _D	T _B	DATA POINT 3			H	GCL TV	V _S
			T ₁	G/A	G/AP			
1	0.591E 02	1.300E 02	0.370E 02	0.030E 02	1.723E 01	1.700E 01	0.103E-02	2.783E 02
2	0.434E 02	1.422E 02	0.500E 02	0.020E 02	1.720E 01	1.700E 01	0.003E-02	2.660E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.060E 01	0.500E 00					
2	2.760E 01	2.060E 01	0.500E 00					

LOCAL TEST PARAMETERS

TEST141,9MIN STEADY POWER,DPI-2445SEC,DPD-16-75SEC,OTHER INTERVALS 1 MIN

STA	P _D	T _B	DATA POINT 4			H	GCL TV	V _S
			T ₁	G/A	G/AP			
1	0.677E 02	1.299E 02	0.340E 02	0.030E 02	1.726E 01	1.670E 01	0.030E-02	2.779E 02
2	0.543E 02	1.412E 02	0.470E 02	0.020E 02	1.713E 01	1.690E 01	0.003E-02	2.663E 02
STA	L/D	DELTA E	LE					
1	2.111E 01	2.050E 01	0.500E 00					
2	2.760E 01	2.050E 01	0.500E 00					

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LOCAL TEST PARAMETERS

TEST141.9MIN STEADY POWER,0.0P1-2E45SEC,0.0P9-1E-73SEC, OTHER INTERVALS 1 MIN

DATA POINT 5

STA	PB	TB	TV	T1	Q/A	Q/AP	N	DEL TR	V3
1	0.537E 02	1.295E 02	5.310E 02	4.094E 02	1.710E 02	1.660E 01	6.022E-02	2.700E 02	1.034E 02
2	0.503E 02	1.408E 02	5.440E 02	4.278E 02	1.767E 02	1.660E 01	5.871E-02	2.370E 02	1.041E 02
STA	L/D	DELTA E	LE						
1	2.111E 01	2.840E 01	4.560E 00						
2	2.760E 01	2.840E 01	4.560E 00						

LOCAL TEST PARAMETERS

TEST141.9MIN STEADY POWER,0.0P1-2E45SEC,0.0P9-1E-73SEC, OTHER INTERVALS 1 MIN

DATA POINT 6

STA	PB	TB	TV	T1	Q/A	Q/AP	N	DEL TR	V3
1	0.537E 02	1.291E 02	5.270E 02	4.037E 02	1.710E 02	1.660E 01	6.133E-02	2.740E 02	1.033E 02
2	0.493E 02	1.404E 02	5.400E 02	4.222E 02	1.710E 02	1.660E 01	5.871E-02	2.810E 02	1.037E 02
STA	L/D	DELTA E	LE						
1	2.111E 01	2.840E 01	4.560E 00						
2	2.760E 01	2.840E 01	4.560E 00						

LOCAL TEST PARAMETERS

TEST141.9MIN STEADY POWER,0.0P1-2E45SEC,0.0P9-1E-73SEC, OTHER INTERVALS 1 MIN

DATA POINT 7

STA	PB	TB	TV	T1	Q/A	Q/AP	N	DEL TR	V3
1	0.537E 02	1.281E 02	5.300E 02	4.080E 02	1.710E 02	1.660E 01	6.022E-02	2.700E 02	1.034E 02
2	0.493E 02	1.400E 02	5.430E 02	4.260E 02	1.767E 02	1.660E 01	5.871E-02	2.360E 02	1.033E 02
STA	L/D	DELTA E	LE						
1	2.111E 01	2.839E 01	4.560E 00						
2	2.760E 01	2.840E 01	4.560E 00						

LOCAL TEST PARAMETERS

TEST141.9MIN STEADY POWER,0.0P1-2E45SEC,0.0P9-1E-73SEC, OTHER INTERVALS 1 MIN

DATA POINT 8

STA	PB	TB	TV	T1	Q/A	Q/AP	N	DEL TR	V3
1	0.537E 02	1.280E 02	5.290E 02	4.070E 02	1.710E 02	1.660E 01	6.021E-02	2.700E 02	1.034E 02
2	0.493E 02	1.400E 02	5.420E 02	4.250E 02	1.767E 02	1.660E 01	5.871E-02	2.350E 02	1.033E 02
STA	L/D	DELTA E	LE						
1	2.111E 01	2.838E 01	4.560E 00						
2	2.760E 01	2.839E 01	4.560E 00						

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TEST 141.0001 STEADY POWER, 0.01-1000SEC. OTHER INTERVALS 1 MIL

LOCAL TEST PARAMETERS								
STA	DATA POINT 9							
	P0	T0	T1	V1	W/A	Q/V0	W	W/LP
1	0.493E-02	1.020E-02	0.200E-02	0.000E+00	1.720E-01	1.000E+01	0.135E-02	2.730E-02
2	0.343E-02	1.030E-02	0.200E-02	0.000E+00	1.720E-01	1.000E+01	0.135E-02	2.730E-02

LOCAL TEST PARAMETERS								
STA	DATA POINT 10							
	L0	DELTA E	LE	T0	T1	W/A	Q/V0	W
1	2.111E-01	2.050E-01	0.000E+00	0.000E+00	1.720E-01	1.000E+01	0.220E-02	2.700E-02
2	2.760E-01	2.050E-01	0.000E+00	0.000E+00	1.720E-01	1.000E+01	0.220E-02	2.600E-02

TEST 141.0001 STEADY POWER, 0.01-2000SEC. OTHER INTERVALS 1 MIL

LOCAL TEST PARAMETERS								
STA	DATA POINT 9							
	P0	T0	T1	V1	W/A	Q/V0	W	W/LP
1	0.491E-02	1.020E-02	0.070E-02	0.000E+00	1.720E-01	1.000E+01	0.135E-02	2.730E-02
2	0.339E-02	1.030E-02	0.070E-02	0.000E+00	1.720E-01	1.000E+01	0.135E-02	2.730E-02

LOCAL TEST PARAMETERS								
STA	DATA POINT 10							
	L0	DELTA E	LE	T0	T1	W/A	Q/V0	W
1	2.111E-01	2.050E-01	0.000E+00	0.000E+00	1.720E-01	1.000E+01	0.220E-02	2.700E-02
2	2.760E-01	2.050E-01	0.000E+00	0.000E+00	1.720E-01	1.000E+01	0.220E-02	2.600E-02

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 142-BD AT 307 AFTER 20 MIN STEADY POWER. 30 SEC DATA INTERVALS.PIN EST

$AF = 0.159E-03$ $D = 0.128E-01$ $L = 0.459E-01$ $00.17A_{TO} = 0.199E-01$

POINT	DATA POINTS											
	PG-IN	PG-OUT	TB-IN	TB-OUT	W	EX	EX	12	SP	WF GDL.	WF GDL.	
1	0.110E-02	0.449E-02	0.100E-01	0.477E-02	1.100E-02	0.437E-01	0.957E-01	0.154E-01	-2.103E-01	0.194E-02	0.194E-02	
2	0.120E-02	0.470E-02	0.110E-01	0.477E-02	1.100E-02	0.437E-01	0.948E-01	0.177E-01	-7.443E-02	0.175E-02	0.175E-02	
3	0.120E-02	0.470E-02	0.100E-01	0.477E-02	1.091E-02	0.437E-01	0.939E-01	0.143E-01	-0.233E-01	0.211E-02	0.211E-02	
4	0.110E-02	0.450E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
5	0.110E-02	0.449E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
6	0.110E-02	0.449E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
7	0.120E-02	0.470E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
8	0.120E-02	0.470E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
9	0.110E-02	0.449E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
10	0.110E-02	0.449E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
11	0.120E-02	0.470E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	
12	0.120E-02	0.470E-02	0.100E-01	0.477E-02	1.090E-02	0.437E-01	0.939E-01	0.144E-01	-0.233E-01	0.203E-02	0.203E-02	

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TEST SECTION

LOCAL TEST PARAMETERS

TEST142.00 AT DPT AFTER 2MIN STEADY POWER. 30 SEC DATA INTERVALS.PIN EST

STA	PB	TB	TU	DATA POINT 1				N	SEL. TP	V2
				T1	O/A	G/AP	G			
1	0.641E 02	1.315E 02	1.012E 03	0.372E 02	1.040E 01	1.912E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
2	0.495E 02	1.405E 02	1.022E 03	0.470E 02	1.030E 01	1.912E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
STA	L/D	DELTA E	LE							
1	2.111E 01	3.657E 01	4.500E 00							
2	2.760E 01	3.657E 01	4.500E 00							

LOCAL TEST PARAMETERS

TEST142.00 AT DPT AFTER 2MIN STEADY POWER. 30 SEC DATA INTERVALS.PIN EST

STA	PB	TB	TU	DATA POINT 2				N	SEL. TP	V2
				T1	O/A	G/AP	G			
1	0.641E 02	1.320E 02	1.012E 03	0.369E 02	1.030E 01	1.907E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
2	0.500E 02	1.405E 02	1.022E 03	0.466E 02	1.030E 01	1.907E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
STA	L/D	DELTA E	LE							
1	2.111E 01	3.646E 01	4.500E 00							
2	2.760E 01	3.646E 01	4.500E 00							

LOCAL TEST PARAMETERS

TEST142.00 AT DPT AFTER 2MIN STEADY POWER. 30 SEC DATA INTERVALS.PIN EST

STA	PB	TB	TU	DATA POINT 3				N	SEL. TP	V2
				T1	O/A	G/AP	G			
1	0.641E 02	1.315E 02	1.012E 03	0.366E 02	1.029E 01	1.902E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
2	0.500E 02	1.405E 02	1.022E 03	0.463E 02	1.028E 01	1.902E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
STA	L/D	DELTA E	LE							
1	2.111E 01	3.647E 01	4.500E 00							
2	2.760E 01	3.647E 01	4.500E 00							

LOCAL TEST PARAMETERS

TEST142.00 AT DPT AFTER 2MIN STEADY POWER. 30 SEC DATA INTERVALS.PIN EST

STA	PB	TB	TU	DATA POINT 4				N	SEL. TP	V2
				T1	O/A	G/AP	G			
1	0.641E 02	1.320E 02	1.012E 03	0.363E 02	1.028E 01	1.897E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
2	0.495E 02	1.405E 02	1.022E 03	0.459E 02	1.027E 01	1.897E 01	0.000E 00	3.000E 00	3.000E 00	1.000E 00
STA	L/D	DELTA E	LE							
1	2.111E 01	3.650E 01	4.500E 00							
2	2.760E 01	3.650E 01	4.500E 00							

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LOCAL TEST PARAMETERS

TEST142.00 AT 8PT AFTER 2000 STEADY POWER, 30 SEC. DATA INTERVALS, P10 CFT

DATA POINT 5							
STA	PW	T0	T1	T2	T3	N	SCN, TP
1	0.031E 02	1.330E 02	1.031E 03	1.040E 02	1.030E 01	1.030E 01	0.100E 02
2	0.032E 02	1.037E 02	1.030E 03	1.030E 02	1.030E 01	1.030E 01	0.100E 02
STA	L70	DELTA E	LE				
1	2.111E 01	3.000E 01	4.000E 00				
2	2.700E 01	3.000E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST142.00 AT 8PT AFTER 2000 STEADY POWER, 30 SEC. DATA INTERVALS, P10 CFT

DATA POINT 6							
STA	PW	T0	T1	T2	T3	N	SCN, TP
1	0.030E 02	1.330E 02	1.030E 03	1.030E 02	1.030E 01	1.030E 01	0.100E 02
2	0.030E 02	1.030E 02	1.030E 03	1.030E 02	1.030E 01	1.030E 01	0.100E 02
STA	L70	DELTA E	LE				
1	2.111E 01	3.000E 01	4.000E 00				
2	2.700E 01	3.000E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST142.00 AT 8PT AFTER 2000 STEADY POWER, 30 SEC. DATA INTERVALS, P10 CFT

DATA POINT 7							
STA	PW	T0	T1	T2	T3	N	SCN, TP
1	0.030E 02	1.330E 02	1.030E 03	1.030E 02	1.030E 01	1.030E 01	0.100E 02
2	0.030E 02	1.030E 02	1.030E 03	1.030E 02	1.030E 01	1.030E 01	0.100E 02
STA	L70	DELTA E	LE				
1	2.111E 01	3.000E 01	4.000E 00				
2	2.700E 01	3.000E 01	4.000E 00				

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LIGNE SURE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 1024-0201 STEAM POWER:0.001-100 SEC:0.20 SEC DATA INTERVALS

AP = 0.130E-01 D = 0.130E-01 L = 0.400E-01 DELTA TB = 0.300E-01

DATA POINTS

POINT	PB-1A	PB-GUT	TP-1A	TP-GUT	V	S2	S3
1	3.397E-03	3.211E-03	8.693E-01	1.204E-02	1.030E-02	3.040E-01	1.323E-02
2	3.326E-03	3.142E-03	7.992E-01	1.203E-02	1.030E-02	3.041E-01	1.323E-02
3	3.256E-03	3.066E-03	7.992E-01	1.201E-02	1.030E-02	3.042E-01	1.323E-02
4	3.186E-03	2.992E-03	7.943E-01	1.194E-02	1.030E-02	3.043E-01	1.323E-02
5	3.097E-03	2.508E-03	7.992E-01	1.191E-02	1.030E-02	3.044E-01	1.323E-02
6	3.031E-03	2.446E-03	7.982E-01	1.190E-02	1.030E-02	3.045E-01	1.323E-02
7	2.962E-03	2.779E-03	7.982E-01	1.186E-02	1.030E-02	3.046E-01	1.323E-02

TEST SECTION

LOCAL TEST PARAMETERS

TEST 143A.2MIN STEADY POWER.DPI-100 SEC.20 SEC DATA INTERVALS

STA	PB	T _B	T _A	DATA POINT 1		H	SEL TP	V _S
				T ₁	G/AP			
1	3.269E 03	1.079E 02	1.120E 03	3.587E 02	2.368E 01	2.238E 01	0.793E -02	1.523E 02
2	3.223E 03	1.174E 02	1.130E 03	3.732E 02	2.365E 01	2.235E 01	0.754E -02	1.530E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.498E 01	4.000E 00					
2	2.358E 01	3.498E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 143A.2MIN STEADY POWER.DPI-100 SEC.20 SEC DATA INTERVALS

STA	PB	T _B	T _A	DATA POINT 2		H	SEL TP	V _S
				T ₁	G/AP			
1	3.199E 03	1.077E 02	1.120E 03	3.729E 02	2.299E 01	2.238E 01	0.414E -02	1.523E 02
2	3.153E 03	1.170E 02	1.131E 03	3.772E 02	2.299E 01	2.238E 01	0.590E -02	1.530E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.498E 01	4.000E 00					
2	2.358E 01	3.498E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 143A.2MIN STEADY POWER.DPI-100 SEC.20 SEC DATA INTERVALS

STA	PB	T _B	T _A	DATA POINT 3		H	SEL TP	V _S
				T ₁	G/AP			
1	3.123E 03	1.079E 02	1.133E 03	3.796E 02	2.360E 01	2.228E 01	0.180E -02	1.523E 02
2	3.077E 03	1.176E 02	1.134E 03	3.816E 02	2.360E 01	2.228E 01	0.430E -02	1.530E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.492E 01	4.000E 00					
2	2.358E 01	3.492E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 143A.2MIN STEADY POWER.DPI-100 SEC.20 SEC DATA INTERVALS

STA	PB	T _B	T _A	DATA POINT 4		H	SEL TP	V _S
				T ₁	G/AP			
1	3.083E 03	1.072E 02	1.135E 03	3.766E 02	2.367E 01	2.238E 01	0.164E -02	1.523E 02
2	3.047E 03	1.173E 02	1.137E 03	3.827E 02	2.367E 01	2.238E 01	0.411E -02	1.530E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.457E 01	4.000E 00					
2	2.358E 01	3.457E 01	4.000E 00					

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LOCAL TEST PARAMETERS

TEST 143A.2MIN STEADY POWER.DP1-180 SEC.20 SEC DATA INTERVALS

DATA POINT 5							
STA	PB	TB	TW	T1	O/A	O/AP	H
1	2.967E 03	1.066E 02	1.135E 03	3.753E 02	2.398E 01	2.238E 01	0.1945E-02
2	2.920E 03	1.166E 02	1.136E 03	3.803E 02	2.398E 01	2.238E 01	0.461E-02
STA	L/D	DELTA E	LE				
1	1.730E 01	3.998E 01	4.000E 00				
2	2.358E 01	3.458E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 143A.2MIN STEADY POWER.DP1-180 SEC.20 SEC DATA INTERVALS

DATA POINT 6							
STA	PB	TB	TW	T1	O/A	O/AP	H
1	2.904E 03	1.064E 02	1.136E 03	3.792E 02	2.312E 01	2.238E 01	0.1982E-02
2	2.858E 03	1.165F 02	1.137E 03	3.803E 02	2.312E 01	2.238E 01	0.4432E-02
STA	L/D	DELTA E	LE				
1	1.730E 01	3.501E 01	4.000E 00				
2	2.358E 01	3.501E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 143A.2MIN STEADY POWER.DP1-180 SEC.20 SEC DATA INTERVALS

DATA POINT 7							
STA	PB	TB	TW	T1	O/A	O/AP	H
1	2.636E 03	1.061E 02	1.135E 03	3.809E 02	2.304E 01	2.238E 01	0.1332E-02
2	2.789E 03	1.161E 02	1.136E 03	3.823E 02	2.304E 01	2.238E 01	0.394E-02
STA	L/D	DELTA E	LE				
1	1.730E 01	3.455E 01	4.000E 00				
2	2.358E 01	3.495E 01	4.000E 00				

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 143B.5 MIN STEADY POWER, DP11-12=37SEC. OTHER INTERVALS 20SEC

AF = 0.138E-03 D = 0.132E-01 L = 0.400E 01 DELTA T0 = 0.300E 01

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	E2	12	OP	HT SAL	G
1	3.422E 03	3.226E 03	8.250E 01	1.219E 02	1.838E 00	3.505E 01	1.340E 03	4.479E 01	4.601E 00	1.34E 04
2	3.415E 03	3.229E 03	8.237E 01	1.219E 02	1.838E 00	3.504E 01	1.344E 03	4.464E 01	3.764E 00	1.334E 04
3	3.412E 03	3.225E 03	8.230E 01	1.220E 02	1.838E 00	3.502E 01	1.344E 03	4.469E 01	3.590E 00	1.334E 04
4	3.404E 03	3.215E 03	8.200E 01	1.216E 02	1.838E 00	3.504E 01	1.345E 03	4.468E 01	3.843E 00	1.334E 04
5	3.395E 03	3.211E 03	8.201E 01	1.219E 02	1.834E 00	3.503E 01	1.344E 03	4.470E 01	3.095E 00	1.337E 04
6	3.398E 03	3.209E 03	8.210E 01	1.219E 02	1.838E 00	3.507E 01	1.347E 03	4.478E 01	3.540E 00	1.334E 04
7	3.387E 03	3.199E 03	8.190E 01	1.217E 02	1.835E 00	3.499E 01	1.344E 03	4.458E 01	3.266E 00	1.332E 04
8	3.389E 03	3.190E 03	8.190E 01	1.216E 02	1.822E 00	3.490E 01	1.344E 03	4.444E 01	3.547E 00	1.327E 04
9	3.379E 03	3.194E 03	8.190E 01	1.217E 02	1.834E 00	3.501E 01	1.346E 03	4.467E 01	3.517E 00	1.331E 04
10	3.375E 03	3.190E 03	8.180E 01	1.216E 02	1.834E 00	3.501E 01	1.344E 03	4.461E 01	3.375E 00	1.331E 04
11	3.376E 03	3.192E 03	8.170E 01	1.215E 02	1.824E 00	3.499E 01	1.345E 03	4.461E 01	3.921E 00	1.324E 04
12	3.363E 03	3.177E 03	8.170E 01	1.216E 02	1.822E 00	3.498E 01	1.339E 03	4.440E 01	2.934E 00	1.327E 04

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 143B.5 MIN STEADY POWER, UP11-12=37SEC. OTHER INTERVALS 20SEC

DATA POINT 1								
STA	PE	T _B	T _B	T _I	Q/A	Q/AP	H	DEL TF
1	3.287E 03	1.096E 02	1.131E 03	3.699E 02	2.317E 01	2.261E 01	8.616E -02	2.693E 02
2	3.236E 03	1.194E 02	1.125E 03	3.771E 02	2.317E 01	2.231E 01	8.663E -02	2.577E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.505E 01	4.000E 00					
2	2.366E 01	3.505E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 143B.5 MIN STEADY POWER, UP11-12=37SEC. OTHER INTERVALS 20SEC

DATA POINT 2								
STA	PE	T _B	T _B	T _I	Q/A	Q/AP	H	DEL TF
1	3.287E 03	1.095E 02	1.135E 03	3.762E 02	2.316E 01	2.234E 01	8.377E -02	2.647E 02
2	3.241E 03	1.190E 02	1.139E 03	3.820E 02	2.315E 01	2.234E 01	8.393E -02	2.632E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.504E 01	4.000E 00					
2	2.356E 01	3.504E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 143B.5 MIN STEADY POWER, UP11-12=37SEC. OTHER INTERVALS 20SEC

DATA POINT 3								
STA	PE	T _B	T _B	T _I	Q/A	Q/AP	H	DEL TF
1	3.283E 03	1.096E 02	1.136E 03	3.781E 02	2.313E 01	2.230E 01	8.316E -02	2.691E 02
2	3.237E 03	1.195E 02	1.140E 03	3.864E 02	2.313E 01	2.234E 01	8.441E -02	2.649E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.502E 01	4.000E 00					
2	2.356E 01	3.502E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 143B.5 MIN STEADY POWER, UP11-12=37SEC. OTHER INTERVALS 20SEC

DATA POINT 4								
STA	PE	T _B	T _B	T _I	Q/A	Q/AP	H	DEL TF
1	3.274E 03	1.092E 02	1.136E 03	3.776E 02	2.316E 01	2.234E 01	8.329E -02	2.694E 02
2	3.227E 03	1.191E 02	1.139E 03	3.820E 02	2.315E 01	2.234E 01	8.366E -02	2.629E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.504E 01	4.000E 00					
2	2.356E 01	3.504E 01	4.000E 00					

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LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER,DP11-12-37SEC, OTHER INTERVALS 20SEC

STA	P0	T0	DATA POINT 6			N	GCL TP	V2
			T1	T2	G/A			
1	3.265E 03	1.093E 02	1.137E 03	3.793E 02	2.314E 01	2.0/4P	2.701E 02	1.813E 02
2	3.222E 03	1.194E 02	1.146E 03	3.833E 02	2.314E 01	2.0/4P	2.649E 02	1.533E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.592E 01	4.000E 00					
2	2.356E 01	3.593E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER,DP11-12-37SEC, OTHER INTERVALS 20SEC

STA	P0	T0	DATA POINT 6			N	GCL TP	V2
			T1	T2	G/A			
1	3.267E 03	1.095E 02	1.138E 03	3.794E 02	2.315E 01	2.0/4P	2.697E 02	1.813E 02
2	3.220E 03	1.194E 02	1.146E 03	3.813E 02	2.315E 01	2.0/4P	2.634E 02	1.533E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.597E 01	4.000E 00					
2	2.356E 01	3.597E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER,DP11-12-37SEC, OTHER INTERVALS 20SEC

STA	P0	T0	DATA POINT 7			N	GCL TP	V2
			T1	T2	G/A			
1	3.258E 03	1.093E 02	1.133E 03	3.789E 02	2.309E 01	2.0/4P	2.667E 02	1.813E 02
2	3.211E 03	1.192E 02	1.137E 03	3.817E 02	2.309E 01	2.0/4P	2.632E 02	1.533E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.499E 01	4.000E 00					
2	2.356E 01	3.499E 01	4.000E 00					

LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER,DP11-12-37SEC, OTHER INTERVALS 20SEC

STA	P0	T0	DATA POINT 8			N	GCL TP	V2
			T1	T2	G/A			
1	3.266E 03	1.092E 02	1.130E 03	3.800E 02	2.308E 01	2.0/4P	2.712E 02	1.807E 02
2	3.213E 03	1.191E 02	1.137E 03	3.813E 02	2.308E 01	2.0/4P	2.641E 02	1.513E 02
STA	L/D	DELTA E	LE					
1	1.730E 01	3.498E 01	4.000E 00					
2	2.356E 01	3.498E 01	4.000E 00					

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LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER.0P11-12=37SEC.OTHER INTERVALS 20SEC

DATA POINT 9							
STA	Pg	T0	T0	T1	T1	G/A	H
1	3.230E 03	1.091E 02	1.013E 03	2.377E 02	2.312E 01	0.345E-02	1.561E 02
2	3.264E 03	1.191E 02	1.137E 03	3.064E 02	2.312E 01	0.345E-02	1.561E 02
STA	L/D	DELTA E	LE				
1	1.730E 01	3.501E 01	4.000E 00				
2	2.350E 01	3.501E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER.0P11-12=37SEC.OTHER INTERVALS 20SEC

DATA POINT 10							
STA	Pg	T0	T0	T1	T1	G/A	H
1	3.240E 03	1.091E 02	1.013E 03	2.377E 02	2.312E 01	0.345E-02	1.561E 02
2	3.290E 03	1.191E 02	1.137E 03	3.064E 02	2.312E 01	0.345E-02	1.561E 02
STA	L/D	DELTA E	LE				
1	1.730E 01	3.501E 01	4.000E 00				
2	2.350E 01	3.501E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER.0P11-12=37SEC.OTHER INTERVALS 20SEC

DATA POINT 11							
STA	Pg	T0	T0	T1	T1	G/A	H
1	3.250E 03	1.091E 02	1.013E 03	3.062E 02	2.309E 01	0.332E-02	1.561E 02
2	3.264E 03	1.191E 02	1.137E 03	3.017E 02	2.309E 01	0.332E-02	1.561E 02
STA	L/D	DELTA E	LE				
1	1.730E 01	3.499E 01	4.000E 00				
2	2.350E 01	3.499E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 1430.5 MIN STEADY POWER.0P11-12=37SEC.OTHER INTERVALS 20SEC

DATA POINT 12							
STA	Pg	T0	T0	T1	T1	G/A	H
1	3.230E 03	1.091E 02	1.013E 03	3.022E 02	2.306E 01	0.322E-02	1.561E 02
2	3.160E 03	1.191E 02	1.137E 03	3.022E 02	2.306E 01	0.322E-02	1.561E 02
STA	L/D	DELTA E	LE				
1	1.730E 01	3.499E 01	4.000E 00				
2	2.350E 01	3.499E 01	4.000E 00				

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DRAFT TRANSMISSION TEST DATA

OVERVIEW TEST FEATURES

TEST 144A-WATER TEST-CHINA STEADY POWER, MIN. DATA INTERVALS 001-111 SFC

AF = 0.132E-03

POINT	DATA POINTS			MT 604.			6		
	PG-OUT	TG-IN	TG-OUT	U	F2	12	OP	5.617E-01	2.4527E-00
1	3.062E-0.3	2.957E-0.3	7.550E-0.1	1.281E-0.2	1.320E-0.0	3.098E-0.1	1.520E-0.3	5.617E-0.1	2.4527E-0.0
2	3.094E-0.3	2.971E-0.3	7.560E-0.1	1.197E-0.2	1.332E-0.0	3.068E-0.1	1.515E-0.3	5.610E-0.1	2.4545E-0.0
3	3.078E-0.3	2.956E-0.3	7.454E-0.1	1.188E-0.2	1.341E-0.0	3.097E-0.1	1.504E-0.3	5.584E-0.1	2.4511E-0.0
4	3.090E-0.3	2.971E-0.3	7.430E-0.1	1.186E-0.2	1.346E-0.0	3.099E-0.1	1.502E-0.3	5.552E-0.1	2.4524E-0.0
5	3.116E-0.3	2.967E-0.3	7.448E-0.1	1.188E-0.2	1.347E-0.0	3.093E-0.1	1.502E-0.3	5.560E-0.1	2.4524E-0.0
6	3.118E-0.3	2.969E-0.3	7.492E-0.1	1.177E-0.2	1.358E-0.0	3.093E-0.1	1.503E-0.3	5.564E-0.1	2.4527E-0.0
7	3.101E-0.3	2.968E-0.3	7.366E-0.1	1.176E-0.2	1.353E-0.0	3.096E-0.1	1.502E-0.3	5.532E-0.1	2.4513E-0.0

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 144A.WATER TEST,6MIN STEADY POWER,1MIN TA INTERVALS,DP1-111 SEC

DATA POINT 1							
STA	Pg	T _B	T _A	T _V	T _I	G/A	GAP
1	3.003E 03	1.042E 02	1.172E 03	2.022E 01	2.011E 01	2.050E 01	2.023E 01
2	2.970E 03	1.173E 02	1.221E 03	2.015E 02	2.011E 01	2.042E 01	2.012E 01
STA	L/D	DELTA E	LE				
1	1.730E 01	3.650E 01	4.000E 00				
2	2.350E 01	3.650E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 144A.WATER TEST,6MIN STEADY POWER,1MIN DATA INTERVALS,DP1-111 SEC

DATA POINT 2							
STA	Pg	T _B	T _A	T _V	T _I	G/A	GAP
1	3.003E 03	1.037E 02	1.223E 03	2.761E 02	2.850E 01	2.875E 01	1.620E 01
2	2.970E 03	1.169E 02	1.240E 03	3.193E 02	2.850E 01	2.875E 01	1.360E 01
STA	L/D	DELTA E	LE				
1	1.730E 01	3.904E 01	4.000E 00				
2	2.350E 01	3.904E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 144A.WATER TEST,6MIN STEADY POWER,1MIN DATA INTERVALS,DP1-111 SEC

DATA POINT 3							
STA	Pg	T _B	T _A	T _V	T _I	G/A	GAP
1	2.998E 03	1.036E 02	1.222E 03	2.837E 02	2.848E 01	2.784E 01	1.550E 01
2	2.960E 03	1.169E 02	1.243E 03	3.191E 02	2.847E 01	2.784E 01	1.390E 01
STA	L/D	DELTA E	LE				
1	1.730E 01	3.897E 01	4.000E 00				
2	2.350E 01	3.897E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 144A.WATER TEST,6MIN STEADY POWER,1MIN DATA INTERVALS,DP1-111 SEC

DATA POINT 4							
STA	Pg	T _B	T _A	T _V	T _I	G/A	GAP
1	3.003E 03	1.047E 02	1.224E 03	2.860E 02	2.850E 01	2.778E 01	1.335E 01
2	2.970E 03	1.187E 02	1.246E 03	3.201E 02	2.850E 01	2.778E 01	1.360E 01
STA	L/D	DELTA E	LE				
1	1.730E 01	3.899E 01	4.000E 00				
2	2.350E 01	3.899E 01	4.000E 00				

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LOCAL TEST PARAMETERS

TEST 144A,WATER TEST,6MIN STEADY POWER,1MIN DATA INTERVALS,DPI-111 SEC

		DATA POINT 5					
STA	Pg	T8	T9	T1	Q/A	Q/AP	H
1	3.034E 03	1.042E 02	1.225E 03	2.035E 02	2.059E 01	2.782F 01	1.552E-01
2	3.034E 03	1.152E 02	1.245E 03	3.149E 02	2.059E 01	2.782E 01	1.394E-01
STA	L/D	DELTA E	LE				
1	1.730E 01	3.905E 01	4.000E 00				
2	2.350E 01	3.905E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 144A,WATER TEST,6MIN STEADY POWER,1MIN DATA INTERVALS,DPI-111 SEC

		DATA POINT 6					
STA	Pg	T8	T9	T1	Q/A	Q/AP	H
1	3.032E 03	1.040E 02	1.222E 03	2.000E 02	2.056E 01	2.783F 01	1.581E-01
2	2.999E 03	1.150E 02	1.245E 03	3.161E 02	2.055E 01	2.783F 01	1.384E-01
STA	L/D	DELTA E	LE				
1	1.730E 01	3.903E 01	4.000E 00				
2	2.350E 01	3.903E 01	4.000E 00				

LOCAL TEST PARAMETERS

TEST 144A,WATER TEST,6MIN STEADY POWER,1MIN DATA INTERVALS,DPI-111 SEC

		DATA POINT 7					
STA	Pg	T8	T9	T1	Q/A	Q/AP	H
1	3.031E 03	1.037E 02	1.220E 03	2.042E 02	2.049E 01	2.768F 01	1.517E-01
2	2.992E 03	1.147E 02	1.245E 03	3.191E 02	2.048E 01	2.769E 01	1.394E-01
STA	L/D	DELTA E	LE				
1	1.730E 01	3.898E 01	4.000E 00				
2	2.350E 01	3.898E 01	4.000E 00				

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LARGE SIDE HEAT TRANSFER TEST DATA

GENERAL TEST PARAMETERS

TEST 1000-WATER TEST-3 MIN STADY POWER-1 min DATA INTERVALS-0.001-12300

$\Delta P = 0.1325 \times 10^3$ $Q = 0.1325 \times 10^3$ $L = 0.400E-01$ $\Delta T = 0.200E-01$

DATA - OILS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	E2	E3
1	3.101E-03	2.988E-03	0.160E-01	1.350E-02	1.293E-00	3.897E-01	3.813E-01
2	3.099E-03	2.987E-03	0.170E-01	1.360E-02	1.310E-00	3.909E-01	3.825E-01
3	3.114E-03	3.002E-03	0.190E-01	1.360E-02	1.322E-00	3.913E-01	3.838E-01
4	3.102E-03	2.993E-03	0.210E-01	1.364E-02	1.315E-00	3.904E-01	3.842E-01
5	3.094E-03	2.984E-03	0.220E-01	1.366E-02	1.317E-00	3.907E-01	3.846E-01
6	3.100E-03	2.986E-03	0.230E-01	1.364E-02	1.323E-00	3.901E-01	3.851E-01

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TEST SECTION

LOCAL TEST PARAMETERS

TEST 144B-WATER TEST-5 MIN STEADY POWER-1 MIN DATA INTERVALS.DP1-123SEC

DATA POINT 1									
STA	PG	T _B	T _B	T _B	T _I	Q/A	Q/AP	H	V _D
1	3.023E 03	1.218E 02	1.224E 03	2.868E 02	2.847E 01	2.763E 01	1.672E-01	1.646E 02	1.511E 02
2	2.995E 03	1.330E 02	1.250E 03	3.273E 02	2.847E 01	2.763E 01	1.613E-01	1.604E 02	1.513E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.867E 01	4.000E 00						
2	2.350E 01	3.897E 01	4.000E 00						

LOCAL TEST PARAMETERS

TEST 144B-WATER TEST-5 MIN STEADY POWER-1 MIN DATA INTERVALS.DP1-123SEC

DATA POINT 2									
STA	PG	T _B	T _B	T _B	T _I	Q/A	Q/AP	H	V _D
1	3.022E 03	1.222E 02	1.239E 03	3.021E 02	2.864E 01	2.763E 01	1.643E-01	1.604E 02	1.527E 02
2	2.994E 03	1.348E 02	1.250E 03	3.203E 02	2.864E 01	2.763E 01	1.646E-01	1.603E 02	1.533E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.915E 01	4.000E 00						
2	2.350E 01	3.909E 01	4.000E 00						

LOCAL TEST PARAMETERS

TEST 144B-WATER TEST-5 MIN STEADY POWER-1 MIN DATA INTERVALS.DP1-123SEC

DATA POINT 3									
STA	PG	T _B	T _B	T _B	T _I	Q/A	Q/AP	H	V _D
1	3.027E 03	1.215E 02	1.237E 03	3.034E 02	2.866E 01	2.763E 01	1.630E-01	1.604E 02	1.515E 02
2	2.999E 03	1.345E 02	1.257E 03	3.347E 02	2.855E 01	2.763E 01	1.637E-01	1.607E 02	1.536E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.913E 01	4.000E 00						
2	2.350E 01	3.908E 01	4.000E 00						

LOCAL TEST PARAMETERS

TEST 144B-WATER TEST-5 MIN STEADY POWER-1 MIN DATA INTERVALS.DP1-123SEC

DATA POINT 4									
STA	PG	T _B	T _B	T _B	T _I	Q/A	Q/AP	H	V _D
1	3.028E 03	1.223E 02	1.235E 03	3.023E 02	2.861E 01	2.773E 01	1.634E-01	1.605E 02	1.523E 02
2	2.999E 03	1.341E 02	1.249E 03	3.241E 02	2.851E 01	2.773E 01	1.640E-01	1.606E 02	1.534E 02
STA	L/D	DELTA E	LE						
1	1.730E 01	3.900E 01	4.000E 00						
2	2.350E 01	3.900E 01	4.000E 00						

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LOCAL TEST PARAMETERS

TEST 144B-WATER TEST.5 MIN STEADY POWER.1 MIN DATA INTERVALS.BP1-122SEC

STA	PB	T0	T1	DATA POINT S			N	REL. IP	N	REL. IP
				0/A	0/A	0/A				
1	3.01E-03	1.22E-02	1.23E-03	3.05E-02	2.89E-01	2.74E-01	1.53E-01	1.63E-02	1.53E-02	1.63E-02
2	2.99E-03	1.34E-02	1.24E-03	3.21E-02	2.84E-01	2.75E-01	1.47E-01	1.61E-02	1.50E-02	1.60E-02
STA	L/D	DELTA E	LE							
1	1.73E-01	3.09E-01	4.00E-00							
2	2.35E-01	3.09E-01	4.00E-00							

LOCAL TEST PARAMETERS

TEST 144B-WATER TEST.5 MIN STEADY POWER.1 MIN DATA INTERVALS.BP1-122SEC

STA	PB	T0	T1	DATA POINT S			N	REL. IP	N	REL. IP
				0/A	0/A	0/A				
1	3.02E-03	1.22E-02	1.23E-03	3.04E-02	2.89E-01	2.74E-01	1.51E-01	1.63E-02	1.51E-02	1.63E-02
2	2.99E-03	1.34E-02	1.25E-03	3.24E-02	2.86E-01	2.75E-01	1.37E-01	2.00E-02	1.37E-01	2.00E-02
STA	L/D	DELTA E	LE							
1	1.73E-01	3.09E-01	4.00E-00							
2	2.35E-01	3.09E-01	4.00E-00							

Report AFRPL-TR-66-263

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1 ORIGINATING ACTIVITY (Corporate author) Aerojet-General Corporation Liquid Rocket Operations Sacramento, California 95809		2a REPORT SECURITY CLASSIFICATION Unclassified 2b GROUP
3 REPORT TITLE Heat-Transfer Characteristics of 98% H₂O₂ at High pressure and High Velocity		
4 DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5 AUTHOR(S) (Last name, first name, initial) Rousar, D. C. Van Huff, N. E.		
6 REPORT DATE August 1966		7a TOTAL NO OF PAGES 225
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8c PROJECT NO.		8d OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AFRPL TR-66-263
10 AVAILABILITY/LIMITATION NOTICES		
11 SUPPLEMENTARY NOTES		12 SPONSORING MILITARY ACTIVITY Air Force Rocket Propulsion Lab. Edwards Air Force Base, California
13 ABSTRACT High-pressure heat-transfer experiments have been conducted with both 90 and 98% H ₂ O ₂ . Electrically heated 3/16- and 1/4-in.-dia Inconel 718 and 3/16-in.-dia stainless-steel test sections were used at pressures of 850 and 4700 psi and at coolant velocities of 25 to 198 ft/sec. Titration of the peroxide after short-duration testing indicated that little or no H ₂ O ₂ decomposition had occurred in the test section. The short-duration burnout tests have shown that the maximum burnout heat flux is directly proportional to coolant velocity and is insensitive to coolant pressure. The Dittus-Boelter equation was found to yield a conservative estimate of heat-transfer coefficients for 98% H ₂ O ₂ and is recommended for design purposes. Long-duration tests conducted at velocities of 50 to 150 ft/sec with Inconel 718 tubing indicated that the long-duration burnout heat flux is degenerated to about 65% of that demonstrated in short-duration tests. Titration of the peroxide after these tests indicated that minor H ₂ O ₂ decomposition had occurred. It can be concluded that 98% H ₂ O ₂ would be an excellent regenerative coolant in rocket engine systems. The long-duration burnout phenomenon at high pressure can be avoided by limiting the design burnout heat flux to about 65% of the short-duration burnout point.		

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Hydrogen Peroxide (90 and 98% H ₂ O ₂) High-Pressure Testing Staged-Combustion Engines Regenerative Cooling High-Heat-Flux Systems Heat-Transfer Testing Forced-Convection Heat-Transfer Characteristics Pressure-Drop Characteristics of 98% H ₂ O ₂						

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9300:0537:JRC:pe

24 January 1967

Subject: Contract AF 04(611)-10785, Report AFRPL-TR-66-263
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